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OF THE
FAMILY ELEOTRIDAE
IN THE
WESTERN INDIAN OCEAN

By

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The Fishes of the Family Eleotridae in the Western Indian Ocean

(With Plates I-III)

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Rhodes University, Grahamstown.

FAMILY ELEOTRIDAE

The Gobioid fishes are one of the major trials of ichthyologists, and when general regional collections are worked up, these fishes tend to be pushed aside, and are apparently often identified with some impatience by those not specially interested. It is not indeed uncommon for later workers to find several species in a bottle supposed to contain only one, or to find one and the same fish in the same collection labelled with different names. All this is understandable, for not only are there numerous species, but almost all are small to minute, so that accurate description and especially illustration are no light undertaking. In addition, they are generally covered with mucus, so that two exactly similar living specimens, preserved in different media, e.g. alcohol and formalin, can emerge looking so completely different, that the purely museum worker may be forgiven for considering them different species.

Being in most parts of little or no economic significance, although normally abundant, especially in tropical areas, these fishes are virtually unknown to any but the expert seeking them. Most species are difficult to distinguish and identify, many exhibiting bewildering variation in form and markings, in some cases even scale counts vary, increasing variably with age. It only adds to the confusion that despite their small size many have colonised vast areas, or are found over astonishing distances, so that the same species has repeatedly been described under different names by several, sometimes many, widely dispersed workers in different lands.

In addition to the existing confusion of species and genera, hardly any two of even those most expert agree about the definition and limits of the higher categories of classification of these fishes. Most give tacit recognition to the division of the major elements into the families Gobiidae and Eleotridae, according to whether the pelvics are united or separate. While this is broadly convenient, experience soon reveals that it is purely arbitrary, for not only are there a number of forms that carry complete transition from one condition to the other, but there is apparently no other really constant confirmatory typical feature in either group.

In our expeditions we found the Gobioid fishes to be abundant in all parts of the Western Indian Ocean, and we have amassed an enormous collection, which contains numerous interesting forms, many previously unknown. Study of the literature has revealed that the classification of this faunal element of the Western Indian Ocean is chaotic, since most workers have clearly paid little more than casual attention to this group or found it beyond them. Descriptions are mostly scanty and inadequate and accurate illustrations are all too rare. For a proper understanding of the many interesting forms recently discovered, it has been necessary virtually to revise the whole of the Indo-Pacific members of this group. At one time my colleagues in Europe and America were inclined to be sceptical about the identification of African material of these minute forms with species previously found in areas as remote as the Pacific, but so many cases of indisputable specific identity have been confirmed that the close connection between even the most sluggish in the faunal elements of Africa and of the Pacific can no longer be denied. A good example is the small feeble **Austrolethops**, known from a single specimen from Australia, described in 1935, which as reported here, has recently been found over a considerable area of East Africa, though curiously enough not yet in any intermediate area.

One especially interesting element in the East African fauna is comprised of forms in which the first gill slit is closed by a strong membrane, and without normal gillrakers on the upper surface of the outer arch. All closely related, they have reduced squamation, the majority being quite naked. There is an apparently similar but remote faunal group in the far Eastern Pacific, mainly along the tropical western coasts of America, which differs chiefly in that the members have 7 spines in the first dorsal fin, and which I suspect will also be found to have the membranous closure of the first gill-slit. The absence of any intermediate corresponding faunal element from the western Pacific and east central Indian oceans is probably more apparent than real, probably due to not very thorough collecting, since we find these forms generally remain concealed by day and that they have considerable resistance to poisons, being among the last of the Gobioid Fishes to appear in treated areas.

It is of interest to note that while many are of dull or sombre hue, a number of the Eleotrid fishes are among the most gorgeous of all creatures, in life being of breathtaking beauty and graceful in movement, though little indication of this remains in preserved specimens handled by purely museum workers.

Most of the Eleotridae in the Western Indian Ocean spend most of their time concealed. They fall into fairly well defined faunal groups, with overlapping habitats ranging from purely fresh water to the open sea. (The purely freshwater forms are not treated here, but are listed in the appendix). **Ophiocara** for example, is not really marine, generally found only in partly saline water, together with **Eleotris**, which, however, extends to more saline mangrove and muddy areas, where such forms as **Asterropterix** are also found, these again extending to sheltered areas in reefs in the open sea. Forms even so minute as **Eviota** appear to live mainly in the higher parts of reefs of the open sea, that bear the full force of the waves at high tide, while others such as **Mucogobius** live within coral in deeper water, but are never seen swimming free. A few of the more colourful types such as **Ptereleotris tricolor** and **Pogonoculius** are free swimming, usually in deeper water, close to coral, almost always in pairs. Forms such as **Ptereleotris microlepis** and **Eleotriodes** appear to spend most of their lives buried in sand, while others are invariably found in rubbly and weedy areas in tide pools. All species are apparently purely carnivorous, the main foods crustacea and larval fishes.

The family Eleotridae may briefly be diagnosed as follows:— Vertebrae 25-30. No airbladder. Gill membranes usually variably attached to isthmus, 4 gills, the first slit sometimes closed, rakers not well developed, sometimes obsolescent on outer arch. Pseudobranchiae usually present, reduced. Mouth more or less terminal, protractile, dentition raptorial, rarely teeth on palate (none in W. Indian Ocean forms). 2 dorsal fins, the 1st of flexible spines, the 2 fins mostly separate. Pelvics with 4-5 soft rays, the bases usually adjacent, the fins separate, sometimes a feeble basal membrane. Body typically scaly, variably to quite naked, no lateral line.

In the Eleotridae as here defined, in the Indo-Pacific some 40-45 genera generally receive recognition. Of these we now list 19 in the W. Indian Ocean, and describe a further 7 as new, (also 3 new subgenera), a total of 26 genera, embracing 43 species, 18 here described as new. All are illustrated here except 4 of which no specimens or illustrations are available. In addition, there are records of other species of doubtful validity. The forms described here appear to fall into 3 subfamilies, as defined in the key below.

KEY TO GENERA OF THE WESTERN INDIAN OCEAN

- A. 1st gill slit at least partly open, usually completely, normally gillrakers on lower limb of outer arch :
 - I. Eyes normally developed. Scales present. **ELEOTRINAE**
 - (a) Less than 20 soft rays in dorsal and anal fins :
 - (1) Pelvics normally with 4 soft rays :
 - (X) 20-25 scales 1. **Eviota**
 - (Y) Many minute scales 2. **Parioglossus**
 - (2) Pelvics normally with 5 soft rays :
 - (X) Less than 50 series of scales :
 - (i) Bony ridge above eye :
 - (a) Interorbital less than eye 3. **Prionobutis**
 - (b) Interorbital more than eye 4. **Butis**
 - (ii) No bony ridges on head :
 - (c) 1-9 spines at preopercle angle 5. **Asterropterix**
 - (cc) No spines at preopercle angle :
 - (d) Nape and interorbital naked :
 - x. Pectoral rays simple. 23 scales. 6. **Eviotops**
 - y. Pectoral rays branched. 28 scales. 7. **Coryogalops nov.**
 - (dd) Nape and interorbital scaly :
 - (e) Head and body highly compressed 8. **Hypseleotris**
 - (ee) Head and body not highly compressed :
 - (f) Head with marked papillate flaps 9. **Mucogobius**
 - (ff) Head not with marked papillate flaps :
 - (x) Head markedly depressed :
 - h. Cheek scales normal size, pectoral rays branched 10. **Ophiocara**
 - hh. Cheek scales enlarged, pectoral rays simple 11. **Calumia nov.**
 - (y) Head not markedly depressed 12. **Trimma**
 - (Y) Scales 50 or more :
 - (i) A concealed spine at preopercle angle 13. **Eleotris**
 - (ii) No spine at preopercle angle :
 - d. Teeth in upper jaw in only one row 14. **Eleotriodes**

- dd. Teeth in upper jaw in several rows :
 e. Head compressed, eye in front of head :
 f. Gill membrane fused with isthmus 15. **Amblyeleotris**
 ff. Gill membrane free from isthmus 16. **Cryptocentrops nov.**
 ee. Head depressed 17. **Xenisthmus**
- (b) More than 20 soft rays in dorsal and anal fins :
 (1) Chin with single fleshy barbel 18. **Pogonoculius**
 (2) Chin with no fleshy barbel :
 (X) Caudal rounded 19. **Laccoeleotris**
 (Y) Caudal emarginate or truncate 20. **Ptereleotris**
- AUSTROLETHOPINAE
- II. Eyes rudimentary. No scales, skin soft and flabby, V. I 4. 21. **Austrolethops**
- B. 1st gill slit completely closed by membrane, no normal gillrakers on lower limb, outer arch. Head, belly, and chest always naked LIOTERINAE
- I. No tentacle above eye :
 (a) Body quite naked 22. **Liotes nov.**
 (b) Few scales on peduncle near caudal base 23. **Chrioledipops nov.**
 (c) Body scaly to shoulder :
 i. Scales cycloid, embedded 24. **Heteroeleotris**
 ii. Scales ctenoid, free 25. **Satulinus nov.**
- II. A tentacle above eye. Body quite naked. 26. **Dactyleleotris nov.**

NOTE: In the descriptions following :

1. Genera in brackets are synonyms.
2. For full details of species read also generic diagnoses.

Subfamily ELEOTRINAE

1. Genus **Eviota** Jenkins, 1903.

Jenkins, 1903, 501.

Genotype **Eviota epiphanes** Jenkins, 1903. Body covered with 20-25 series of mostly ctenoid scales, the head, nape, chest and narrow area along dorsal base naked. Mouth moderate, with bands of small teeth, sometimes a few caniniform, palate edentate. Gill openings lateral, gill rakers few, rudimentary. D VI+I 8-10. A I 7-9. Pectorals with upper rays simple, most lower branched, fimbriate. Pelvics separate, I 4, sometimes a rudimentary 5th ray, the 4 rays "feathery".

Tiny fishes, of coral areas, rarely exceed 25 mm, previously regarded as confined to the Pacific, now recorded from all parts of the Western Indian Ocean north of 22°S, also in the Red Sea. About 12 species have been described, chiefly from preserved material, but competent review will reduce these. Both in life and preserved colour and markings are variable. The live fishes are translucent, the colours appear to be at least partly within the flesh, which becomes opaque on preservation, when dark marks, mostly not visible in live fishes, make their appearance. As described below these fishes show sexual dimorphism, which has doubtless increased the number of nominal species. In our material from the W. Indian Ocean there appear to be 3 species, difficult to assign with certainty to any previously described, and therefore described in detail as new.

- A. In life greenish, with red markings. As preserved, usually 2 distinct dark spots behind eye. Teeth on side of lower jaw in 1-2 series **verna**
- B. In life grey or greyblue, with red or orange marks :
 (1) As preserved, usually 2 dark spots on pectoral base. Teeth on side of lower jaw in band of 4-6 series **stigmapteron**
 (2) As preserved, dark marks over most of top of head and nape, cheeks mottled. No distinct separate pair of dark spots behind eye or on pectoral base. Teeth on side of lower jaw in 2 series **nebulosa**

Eviota verna n. sp.

(Plate I, J,K,L)

D VI+I 8-10, normally 9. A I 7-8, normally 8. P 9-10+5-6+1 = 16-17. V I 4. Lateral series of scales 22-25, Tr. 6-7. 2+1+6-8 short gill rakers. In percent of standard length: total length 118; depth 21-23; head 25-27; width of head 19; pectoral 25-27; pelvic 25-28; 1st dorsal spine 14(fem)-27(m); 3rd 14; longest dorsal ray 14; depth peduncle 14. Head 3.8-4; depth 4.4-4.6 in body length. Pectoral 1.0-1.1; pelvic 1.0-1.1 in head. Width of head 1.3 in length. Eye 3.8-4 in head, 1.6 times snout.

Body robust anteriorly, compressed posteriorly, depth variable, increases with age, males usually more robust. Interorbital very narrow, with central median pore, and one behind opposite hind edge of pupils. Snout blunt, more so in males. Anterior nostril at front of snout, with tubule longer than wide, apically dilated, posterior nostril wider, close before eye, a low tubule. Gill openings restricted to pectoral base, rakers short truncate knobs.

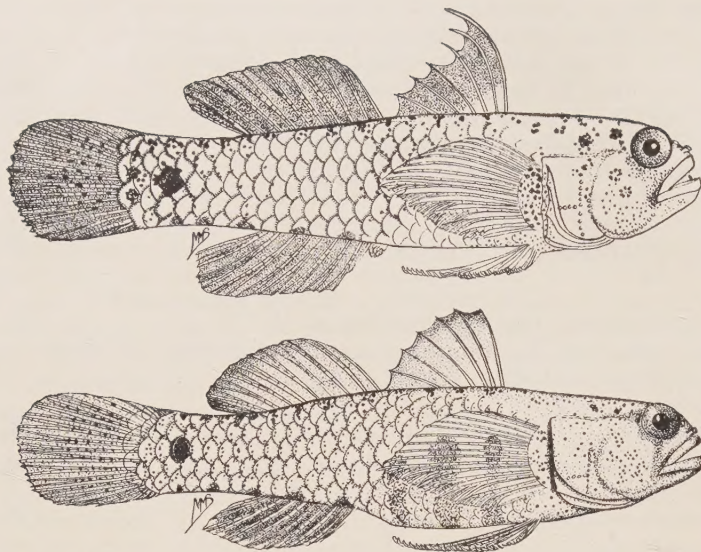


Fig. 1. *Eviota verna* n. sp., above, male, Type 23 mm.; below, female, 22 mm.

In males 1st dorsal spine longest, variable, apex flattened. In females the 1st spine is less than or equals 2nd. Membrane from last spine rarely reaches 2nd dorsal, which is highest in front. Last dorsal ray variably single or double, when single, count usually 10. Anal inserted slightly behind 2nd dorsal, rays increase slightly to penultimate. Pectorals in males with mostly 9 upper rays, also lowest simple, most females have 10, other 6-7 branched, total 16 or 17, 2nd-6th from below apically fimbriate. Pelvic rays apically fimbriate, fin normally reaches almost to vent, not to anal. Caudal subtruncate to gently rounded.

Mouth moderate, oblique, maxilla extends to below about middle of eye. Mature males and females show different dentition. Both have in the upper jaw a continuous narrow band of villiform teeth, outside this on each side in front a series of 4-5 well spaced curved caniniform teeth, the hindmost 2 largest, recurved, markedly longer in males. In the lower jaw males have in front on each side 4-5 almost exert recurved caniniform teeth, behind these on each side a patch of villiform teeth, the groups separate, and behind each a large (rarely 2) prominent recurved canine, sometimes with 2-3 much smaller behind, along side of jaw 1-2 series of fine villiform teeth. Females have 4-5 recurved caniniform teeth on each side in front of lower jaw, a wide patch of villiform teeth behind and similar teeth in a narrow band (1-2 series) along side of jaw, no large canine behind the villiform teeth in front of jaw, (prominent in males), by exception one very small. Tongue apically free, rounded.

Scales ctenoid, but cycloid on belly. Head, nape, narrow area along 1st dorsal base, and prepelvic area naked. Scales larger towards caudal base.

Colour: alive; body translucent, mostly greenish or green blue, markings usually reddish, some yellow, patterns rather variable, typical patterns shown in Pl I, J, K, L: as preserved; rather variable, but all variants of a regular pattern. Most have a pair of small dark spots each side of nape, just behind eye. These vary from virtually invisible to dense black, sometimes joined across occiput to form transverse bars. In the young behind eye are usually 3 dark concentric areas, 1st adjacent to the orbits, other 2 outside, which later break on occiput to form 2 spots on each side. Sometimes there are other small spots covering most of occiput and front of nape. A dark spot median on peduncle just before caudal base almost always present, rarely faint or absent. Sometimes 1-2 faint dusky spots on pectoral base. On alternate scales along dorsal base a dusky mark, sometimes as short bar; 3-5 similar marks along anal base and 1-2 on peduncle, these sometimes almost united across tail forming vague to distinct cross bars, especially in the young. Some have 2-3 dark marks on belly, others 2-3 broad dark cross bars. Dorsal and anal fins usually but not always with fine dusky spots, also hind half of caudal. Pectorals and pelvics light. Edges of scales often dusky.

Described from specimens from different localities, the type, a male, 23 mm. in length from Aldabra, in this Department. Numerous specimens, 8-23 mm. in length, taken from coral pools at low tide by poison from Bazaruto northwards along the East African coast, at Zanzibar, Pemba, Mafia, and all islands to Seychelles, in some areas abundant. This form we came to recognise as the "Green Eviota", markings in life and body shape variable, usually deeper with age, especially in males. On preservation colours have mostly gone and dark marks on body are variable, some specimens show none but the dark spot near the caudal base which usually develops on preservation. After close study of descriptions, in this material alone I can find individuals that, separately, could be assigned to: *prasinus* Klunzinger, 1871: *viridis* Waite, 1904: *smaragdus* Jordan and Starks, 1905: *zonura* J & S, 1905: *gymnocephalus* Weber, 1913. However, all my specimens intergrade and I cannot find any feature on which such species may clearly and constantly be distinguished. Schultz, 1943, has given an analysis of mid-Pacific species, but with my material this gives no satisfactory separation.

As I cannot certainly assign these fishes to any one species, the name **verna n.sp.** is applied to them.

A ripe female 20 mm. in length proved to contain about 23% by weight of eggs, about 300 demersal eggs of diameter about 0.5 mm.

Eviota stigmapteron n.sp.

(Plate I, H)

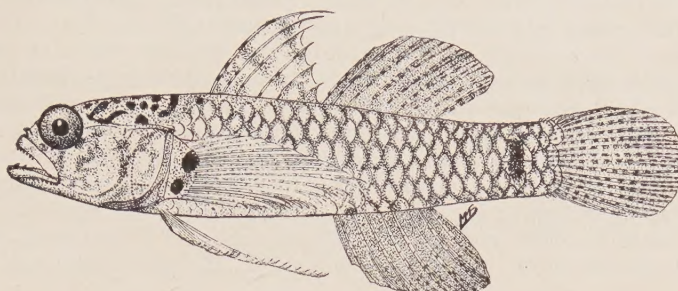


Fig. 2. *Eviota stigmapteron* n.sp. Type, 20 mm.

D VI+I 8. A I 7-8. P 9+6-7+1 = 16-17. V I 4. 22-24 series of scales, Tr. 6-7. Gill rakers rudimentary, 2+1+2.

In percent of standard length: total length 123; depth 21-23; head 29; width of head 19; pectoral 34; pelvic 35; 1st dorsal spine 28; 3rd 19; 5th 6; longest dorsal ray 21; depth peduncle 13. Head 3.4; depth 4.3 in body length. Pectoral equals pelvic, 1.2 times head. Width of head 1.4 in length. Eye 3.5 in head, 1.8 times snout.

Body fairly robust in front, tail compressed, depth variable. Interorbital a narrow ridge, with central median pore, and one behind opposite hind edge of pupil. Snout blunt. Anterior nostril with short tubule at front of snout, hinder just before eye, slightly wider, with low tubular rim. Gill openings restricted to pectoral base, rakers feeble, 2 small points on upper limb, one digitate raker in angle, then 2 feeble knobs in front, others doubtful. First dorsal spine in males little to clearly longer than 2nd, less than head. Membrane from last spine almost reaching origin of soft fin, which is little higher in front. Anal inserted under or slightly behind soft dorsal origin, rays increase little posteriorly. Pectorals with 8 upper, and the lowest simple, other 7-8 branched, total 16-17, 2nd-6th from below fimbriate, fin reaches to below 4th dorsal ray in males, to below 2nd in females. Pelvic spine short, rays fimbriate, fin just reaches anal in male, barely reaches anus in female. Caudal subtruncate to feebly rounded.

Scales mostly ctenoid, those in front on shoulder and on belly cycloid. Scales increase in size along tail.

Mouth moderate, oblique, maxilla extends to below middle of eye. Across front of upper jaw a wide-set series of 8 subequal curved caniniform teeth, the hindmost largest, inside these a moderate band of fine villiform teeth to hind end of jaw, about 4 series. Across front of lower jaw 6 or 7 small recurved teeth, behind these a broad band of sharp villiform teeth in 4-5 series, extends to hind end of jaw; in males, on each side, in front, behind band of fine teeth, 1-2 large erect recurved canines, wide set, behind these a few much smaller, graduated lower hindwards. Tongue free, rounded.

Colour: alive; grey or grey-blue, with red-brown spots on occiput, two prominent dark brown spots on pectoral base, a blackish blotch near caudal base, the body generally with fine vertical brick red streaks. Dorsals and anals dusky with reddish glints, caudal dusky, paired fins hyaline. As preserved; opaque white, some specimens with dark spots on occiput, all with 2 prominent dark spots on pectoral base and a dark spot at caudal base, a few have small dark spots along anal base.

Described from 7 specimens, 18-23 mm. in length, from Baixo Pinda, Mozambique, Aldabra and Seychelles; the type, a male, 20 mm. in length, from Mahé, Seychelles, in this Department.

Eviota nebulosa n.sp.

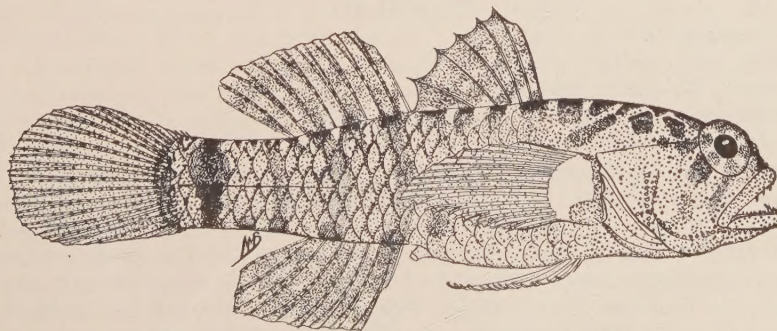


Fig. 3. *Eviota nebulosa* n.sp. Type, male: 20 mm.

D VI+I 8. A I 7-8, normally 7. P 8-10+5-6+1 = 15-16. V I 4. Scales 22-23, Tr. 6-7. Gillrakers feeble.

In percent of standard length: total length 125; depth 25-26; head 28; width of head 20; pectoral 27; pelvic 21; 1st dorsal spine 14; 2nd 17; longest dorsal ray 16; depth peduncle 14. Head 3.4; depth 3.4-3.6 in body length. Pectoral 1.0, pelvic 1.3 in head. Width of head 1.4 in length. Eye 3.0-3.2 in head, 1.8 times snout.

Body fairly robust in front, tail compressed, depth variable. Interorbital a narrow ridge, with central median pore, and one behind opposite hind edge of pupil. Snout blunt. Anterior nostril with short tubule at front of snout, hinder just before eye slightly wider with low tubular rim. Gill openings restricted to pectoral base, rakers feeble, 2 small points on upper limb, one digitate raker in angle, then a few feeble knobs in front, others doubtful. First dorsal spine in males shorter than 2nd. Membrane from 1st fin almost reaches 2nd. Anal inserted about opposite soft dorsal origin. Pectoral with 8-10 upper and one lower ray simple, 5-6 inner branched, fin reaches end of 1st dorsal. Pelvics to or beyond anus. Caudal gently rounded.

Mouth moderate, oblique, maxilla to below middle of eye. Teeth in villiform band in upper jaw; outside these from the front is a widespaced single series of 5-6 recurved caniniform teeth, largest midway along side, behind this 2-3 smaller teeth. In lower jaw, on each side, 4-5 slender recurved teeth in front; behind these a cluster of villiform teeth, and within each, in males, is a moderate recurved canine. On side of jaw is a narrow band of smaller teeth, one outer series small, the inner adjacent, longer. Tongue acutely rounded, apex free.

Scales all ctenoid except those on belly and a few below pectoral; they increase in size along the tail.

Colour, live; green blue, scales on body margined with russet, generally covered with reddish speckles. Most of nape with 5-6 spotted red saddles, those in front broken into spots, 2-3 behind eye. Cheek and side of head mostly with fine red and brown spots, also on pectoral base, chin and chest. A dusky bar across peduncle and 4-5 fainter bars between anal and soft dorsal, the ends at anal base darker. Yellow or orange patch over pectoral base. 1st dorsal spotted dark red, 2nd dorsal, anal and caudal base dusky, other fins light. As preserved: milky grey with dusky specklings and marks as described above, spinous dorsal notably dark, whole head covered with specks.

Described from specimens from Pinda (3), Ibo (1), and La Digue Is. (1), 16-19 mm. in length, the type, 20 mm., from Pinda, Mozambique, in this Department. Among large numbers of such fishes, only 5 marked in this way were found. They appear to merit distinction from the colouration and because the 1st dorsal spine is apparently not enlarged in the male.

2. Genus **Parioglossus** Regan, 1912.

Regan 1912, 302.

Genotype **P. taeniatus** Regan, 1912. Head and body strongly compressed, head naked, body covered with small scales. Mouth almost vertical, 6 canines in front of upper jaw, an inner series of smaller teeth, 4-5 canines each side of lower jaw, lateral teeth uniserial. Gill opening restricted to pectoral base. Pelvics close together, I 4. Two species, one Indian Ocean, one Queensland. Will possibly be found to fall in the Lioterinae.

Parioglossus taeniatus Regan, 1912 (as above)

No specimen available, compiled from Regan. With characters of the genus. D VI 16-17. A I 15. V I 4. Depth 6, head 5 in body. Eye 2.5 in head. Angle of mouth below front of eye. Dark band from eye to end of caudal, dorsals and upper caudal edge dusky. One, probably a male, has anal with dark edge and higher dorsal fins, the rays more or less produced. 2 specimens, 25 and 30 mm. total length, Aldabra. A sketchy diagnosis, without figure, the species not since found.

3. Genus **Prionobutis** Bleeker, 1874

Bleeker, 1874, 295, 305.

Genotype **Eleotris dasyrhynchus** Gunther, 1868. Robust body covered with moderate mostly ctenoid scales, head partly scaly. Serrated ridge above eye. Snout short. Small teeth in bands, no canines. Gill openings extend under head. A few species, tropical indo-Pacific, one in our area.

Prionobutis koilomatodon (Bleeker), 1849

(Plate II, D)

Eleotris koilomatodon Bleeker, 1849, 21.

Eleotris caperatus Cantor, 1850, 1179.

Eleotris caperata, Gunther, 1861, 117. Day, 1878, 315.

Prionobutis koilomatodon, Herre, 1927, 52, Pl 4, fig. 2.

Butis caperatus Smith, 1949, 339, Pl 73, fig. 939.

D VI+I 8-9. A I 8-9. P 1, 19-20. V I 5. 28-30 scales; Tr. 7-9, 12-13 predorsal. 3+1+8 moderate gill-rakers. Depth 3.5-4. Head 3-3.5 in body. Eye 4 in head, about 2.5 times interorbital. Anterior nostril a wide tube, posterior a wide pore at eye. A serrated ridge over eye, and 2 crenulate ridges each side of snout. Gill-openings wide, extend to below preopercle margin. 1st gill cleft with membrane in front, 9 fairly long rakers up to membrane, 13 knobs on inner edge of arch. Spinous dorsal lower than soft, dorsal and anal end well before caudal, peduncle twice as long as deep. Pectorals reach beyond anal origin. Pelvic bases widely separate, fin reaches vent. Caudal broad, rounded. Mouth oblique, maxilla extends below front of eye. In each jaw a band of 4-5 series of fine teeth, single spaced outer series enlarged. Palate edentate. Tongue broadly rounded.

Scales ctenoid, those on pectoral base, belly and chest cycloid and smaller. Head scaly, except interorbital, muzzle and lower half of cheek and chin. 10 round peduncle.

Colour: in life; variable, usually as shown in Pl II. As preserved, yellowish, darker marks much as in Pl II. Described from numerous specimens, 25-75 mm., from Delagoa Bay, among stones in turbid water far from sea. Widespread in tropical Indian and W. Pacific.

4. Genus **Butis** Bleeker, 1874

Bleeker 1856, 412.

Genotype **Cheilodipterus butis** Hamilton, 1822. Much like **Prionobutis**, (which see above) but with longer depressed snout. Tropical Indo-Pacific, few species, one in our area.

Butis butis (Hamilton), 1822

(Pl III, A)

Cheilodipterus butis Hamilton 1822, 57, 367.

Eleotris butis Gunther 1861, 116. Sauvage 1875, 380, 520. Bleeker & Pollen 1875, 64. Steindachner 1881, 243. Boulenger 1916, 10, fig. 6. Pellegrin 1933, 122, fig. 68.

Butis butis Pollen 1868 (no pages). Koumans 1953, 306.

Eleotris humeralis Valenciennes 1837, 246. Bleeker 1849, 22.

Eleotris melanopterus Bleeker 1852, 706.

Eleotris amboinensis (non Bleeker) Day 1878, 316.

No specimen available. D VI+I 8. A I 8-9. P 18-20. About 30 scales. Tr. 9-10. Predorsal 18-20. Depth 5-6, head 2.7-3 in body. Eye 5-6 in head, 1-1.5 in interorbital. Snout broad and flat. Anterior nostril tubular, posterior an open pore before eye. Bony crest above eye smooth or feebly serrate, 2 feeble ridges each side of snout. Gill-openings probably extend forward, no information about gillrakers. Mouth large, maxilla extends to eye. Fine teeth in bands in each jaw, outer series enlarged, in lower jaw some inner larger. Whole body and head, except muzzle, scaly, mostly ctenoid, those on pectoral base and chest cycloid. 1-12 auxiliaries on most body scales.

Colour: live; usually dark olive to green, yellowish about head, 5-6 dark cross bars. Nape mottled. Dark streak from snout through eye to opercle. On pectoral base a dark spot with pink above and below. Each scale with a white or red spot forming rows. 1st dorsal blotched greenish and pale dusky, 2nd dorsal light, spotted, anal and pelvic with white and dark spots, margins red. Caudal pale, distally dusky. Attains 140 mm. Widespread in sheltered waters of tropical Indian and W. Pacific, enters estuaries. Has been recorded from E. Africa, Comores, Madagascar and Zanzibar.

5. Genus **Asterropteryx** Ruppell, 1828

Ruppell, 1828, 138.

(**Brachyeleotris** Bleeker, 1874).

Genotype **A. semipunctatus** Ruppell, 1828. Robust compressed body covered with about 25 ctenoid scales. Head scaly except interorbital and snout. Preopercle margin with 1-9 spines, a large pore at base of upper. Narrow bands of small teeth in jaws, some enlarged, 2 lower canines. Gill openings wide. Small fishes mainly of mangrove areas or cloudy water. Probably 2 species, one with 3-9 short spines, the other with one long spine at preopercle margin, otherwise exactly alike.

Asterropteryx semipunctatus Ruppell, 1828

(Pl 2, J)

Asterropteryx semipunctatus, Ruppell, 1828, 138, Pl 34, fig. 4. Gunther, 1861, 132.

Peters, 1876, 441. Peters, 1883, 54.

Asterropteryx semipunctatus, Klunzinger, 1871, 484. Hemprich & Ehrenberg, 1899, 7. Pellegrin, 1904, 2.

Bamber, 1915, 483. Gudger, 1929, 513. Smith, 1955, 22, fig. 27. Smith, 1956, 828.

Asterropteryx semipunctata, Sauvage, 1875, 521. Gunther, 1877, 187, Pl III, fig. D.

Eleotris cyanostigma, Bleeker, 1855, 452. Jatzow & Lenz, 1898, 509. Borsieri, 1904, 207.

D VI+I 9-10. A I 8-9. P 1 15-16. V I 5. 24-25 series of scales; Tr. 8-9, predorsal 6-7. 4+1+9 blade-like gillrakers. Body deepens with age and forehead becomes slightly gibbous. 3-9 spines on preopercle, normally 4-5. Interorbital about $\frac{1}{2}$ eye. Large pores on head. Front nostril shortly tubular, hinder a large pore at front of eye. 3rd dorsal spine filamentous, in males reaches caudal base. Penultimate dorsal ray shortly filamentous in adults, reaches caudal. Only uppermost pectoral ray simple, rest divided. Pelvics "feathery", reach beyond anal origin, bases separate, often a low connecting membrane. Scales on chest, pectoral base and predorsal cycloid, remainder ctenoid, even on cheeks. Mouth not to front of eye. In upper jaw band of small teeth, outer single row enlarged, in lower a similar band, outer series much larger, hindmost on side caniniform, also inner row slightly enlarged. Tongue barely free, obtuse. Colour: as shown in Pl 2; in life spots brilliant. Preserved, dull or dark brown, sometimes irregular darker marks on flanks, larger specimens show 6-7 darker cross bars equal to interspaces. Attains 65 mm. Known from whole tropical Indian, west and central Pacific. Abundant in the W. Indian Ocean as far as 27°S in E. Africa. Somewhat variable in colour and shape, is sometimes a puzzle at first sight.

Asterropteryx ensiferus (Bleeker), 1874

Brachyeleotris ensifera Bleeker 1874, 375.

Asterropteryx monacanthus Regan 1908, 240.

No specimens available, known from the E. Indies, once reported from Almirante Is. by Regan. Almost exactly similar to **semipunctatus** Ruppell, except stated to have one rather long spine at preopercle margin. Attains 35 mm.

6. Genus **Eviotops** Smith, 1956

Smith 1956, 825.

Genotype **E. infulatus** Smith, 1956. Body covered with 22-23 series of ctenoid scales, a few cycloid behind pelvic base; head, nape and chest naked. Mouth moderate, fine teeth in bands in each jaw, outer series on side enlarged, no canines. Gill-openings restricted to pectoral base, rakers feeble, gill filaments "feathery". All pectoral rays simple, apically free from membrane. V I 5, "feathery", elongate. Related to **Eviota** Jenkins, differs in having pectoral rays all simple, elongate pelvics and other features. Only the type known.

Eviotops infulatus Smith, 1956

Smith 1956, 826, fig. 4.

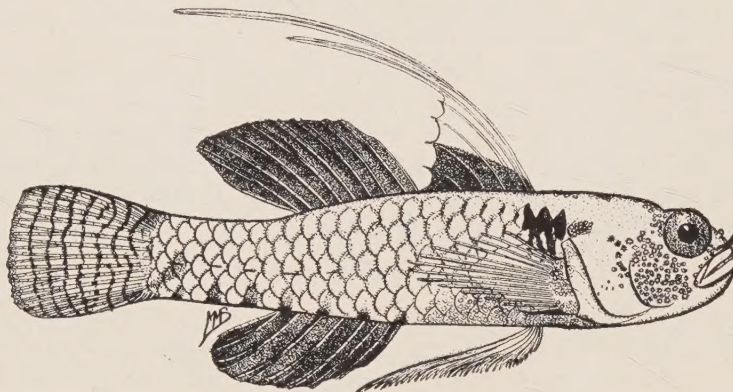


Fig. 4. **Eviotops infulatus** Smith, Type, 18 mm.

With the characters of the genus. D VI+I 8. A I 7. P 14. V I 4, 1. 22-23 series of scales; Tr. 7. 1+1+7 gill rakers. Interorbital very narrow. Front nostril prominent tube, hinder short tube. Maxilla to below front third of eye, narrow band of fine teeth in each jaw, outer series of 6-7 enlarged each side. 1st dorsal spine longest, in male $\frac{2}{3}$ body length, 2nd also long, both ribbon-like.

Colour: alive; translucent in greenish with dusky blotches within the flesh from ventral surface of caudal peduncle and anal. Edges of scales form irregular pattern. A prominent dark brown irregular W-shaped mark above base of pectoral. Chest and pelvic base with minute bluish ocelli. Dusky and bluish spots on cheek, opercle greenish. Front nostril and behind eye dusky. Nape dull green with 3-4 rounded brown blotches before dorsal. 1st dorsal dusky basally, above hyaline. Soft dorsal and anal fins dusky, membrane with fine blue and green dots. Caudal green yellow, often with transverse lines or rows of brown spots, lower lobe dusky. Pectorals and pelvics light. Preserved, generally light, edges of scales dusky, the W-mark black, dorsal and anal dusky, other fins light. Dark marks on nape, cheek and chest.

Specimens 14-20 mm., from coral rubble at Mahé and Aldabra. One of the smallest vertebrates known.

7. Genus **Coryogalops** nov.

Genotype **Coryogalops anomolus** n. sp. Body moderately compressed, with moderate ctenoid scales to shoulder; chest, nape and head naked. Fine teeth in bands in each jaw, some outer in front enlarged, 1-2 small canines below, palate edentate. Gill-openings restricted, rakers few, short. Pelvic bases separate, 5 soft rays, outer 4 "feathery", 5th simple. Related to **Heteroleotris** Bleeker, but distinguished by having ctenoid scales and the 1st gill slit open. Related also to **Eviota** Jenkins, but has more scales, more rays in dorsal and anal, 5 pelvic rays, virtually all pectoral rays divided, none fimbriate. Only one species in E. Africa.

Coryogalops anomolus n. sp.

D VI+I 11. A I 10. P 1, 16=17. V I 5. 28 series of scales, 19 behind 2nd dorsal origin, Tr. 10. Gill-rakers 2+1+6. In percent of standard length: total length 124; depth 19; head 31; eye 9; pectoral 27; pelvic 26. Head 3.2, depth 5.0 in length. Eye 3.3 in head, almost twice snout. Body and head rather compressed, snout rather steep. Several series of papillae on cheek. Eyes dorsal, virtually contiguous. Front nostril in short tube in front, hinder a pore on orbital margin closed by a flap. Gill-openings restricted to pectoral base, rakers short recurved knobs, front fourth of 1st gill arch with membrane above.

1st dorsal inserted over front of pectoral, origin 2nd fin midway between caudal base and eye. Pectoral rounded, reaches beyond origin 2nd dorsal, all but upper ray divided. Pelvic bases not widely apart, fins separate, apex short of anus, first 4 rays distinctly "feathery", 5th simple. Mouth fairly oblique, lower jaw hardly projects, maxilla reaches below hind edge of pupil. In upper jaw an outer single series of wide-

spaced recurved caniniform teeth, inside these a band of villiform teeth, a few posterior in front enlarged, retrorse. In lower jaw in front on each side a row of 4-5 recurved caniniform teeth, behind these a band of villiform teeth, on each side inside these 1-2 recurved canines. Palate edentate. Tongue subtruncate. Body to behind line between dorsal origin and pectoral axil covered with moderate strongly ctenoid scales, reach dorsal base, those on belly cycloid. Head, nape, pectoral base, prepelvic area and small area behind pelvics naked.

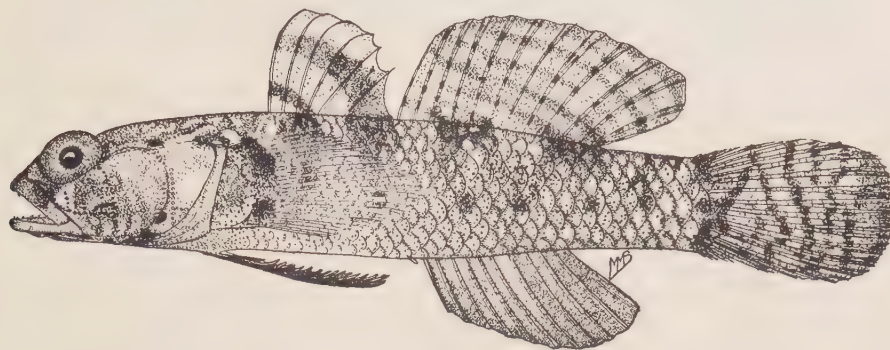


Fig. 5. *Coryogalops anomalus* n. sp. Type, 33 mm.

Colour: alive, drab olive, with vague brown cross mottlings, and spots as shown, an orange blotch on opercle. 2 spots on pectoral base, 2 curved bars on 1st dorsal, 2nd dorsal and caudal spotted and barred. Dark spots on chin. As preserved, similar.

Described from 3 specimens, 25-33 mm. in length, from Ibo, Shimon and Zanzibar, the type, 33 mm. in length, from Zanzibar, in this Department. Differs from *Heteroeleotris* in having all gillslits open and ctenoid scales, scaling reaching base of 1st dorsal.

8. Genus *Hypseleotris* Gill, 1863

Gill 1863, 270.

(*Giuris* Sauvage, 1879. *Caulichthys* Ogilby, 1898).

Genotype *Eleotris cyprinoides* Valenciennes, 1837. Strongly compressed body covered with large ctenoid scales, head scaly except muzzle. Mouth small, fine teeth in bands in each jaw, outer series larger, no canines. Gill openings wide, to below head. A few small free swimming species of rivers and estuaries of the tropical central Indo-Pacific, one reported from our area. In highly compressed body and habits differ from most others of this group.

Hypseleotris cyprinoides (Valenciennes), 1837

Eleotris cyprinoides Valenciennes, 1837, 248. Guichenot, 1863, 27. Sauvage, 1875, 520.

Asterropteryx cyprinoides Bleeker & Pollen, 1875, 78.

Hypseleotris cyprinoides Koumans, 1953, 328.

No specimen available. With characters of the genus. D VI+I 9. A I 9. P 14. V I 5. 26-28 scales; Tr. 8, predorsal 15. Depth about 4.3, head about 3.8 in body. Mouth not to eye. Live colours unknown, preserved said to be brownish with a dark spot at pectoral base above, 2nd dorsal and caudal spotted. Attains 65 mm. Reported from Madagascar, Reunion and Mauritius, also from Philippines (Jordan & Seale, 1905). A doubtful species, rarely seen, no illustration available.

9. Genus *Mucogobius* McCulloch, 1912

McCulloch, 1912, 93. (*Metagobius* Whitley, 1930).

Genotype *Gobius mucosus* Gunther, 1871. Rather robust body covered with moderate cycloid or ctenoid scales or both. Head except muzzle with cycloid scales. Dorsal and anal of few rays. V I 5. Head and sometimes body with papillate skinny flaps. Teeth in band, outer series enlarged. Gill openings lateral, rakers few. Small fishes living mostly in coral, notably covered with thick coating of mucus, one species abundant and widespread in the W. Indian Ocean, probably extends eastwards to central Pacific, I suspect there has been considerable confusion in its identity. 3 species listed here :

- | | |
|---|-----------------------------|
| A. Scales ctenoid | flavobrunneus n. sp. |
| B. Scales cycloid : | |
| I. 40 scales, Tr. 17-18. 9 rakers | bifasciatus n. sp. |
| II. 45 scales, Tr. 12. 6 rakers | liolepis |

***Mucogobius flavobrunneus* n. sp.**

(Pl II, C)

***Metagobius sclateri* (non Steindachner) Smith, 1956, 818 (Aldabra).**

D VI+I 9 (rarely 10). A I 8. P 16-18. V I 5. 37-40 series of scales; Tr. 12-13, predorsal 17-20. Gill-rakers 0+I+5.

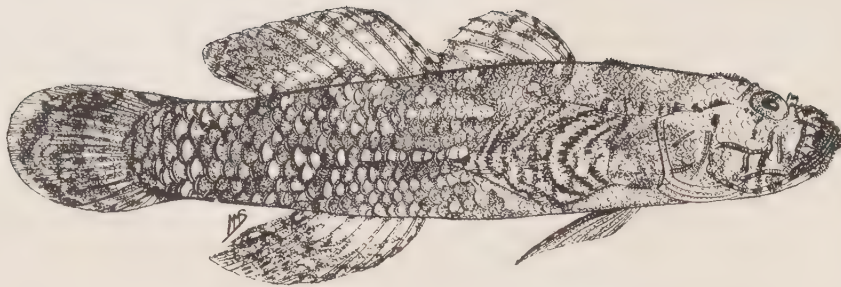


Fig. 6. *Mucogobius flavobrunneus* n. sp. 67 mm.

In percent of standard length: total length 115; head 24-27; depth 20-24; pectoral 20-24; pelvic 20; depth peduncle 13; 3rd dorsal spine 13; 2nd dorsal ray 15. Depth 4.2-5, head 3.8-4 in body. Eye 3.8-4.5 in head, 1.0-1.2 in snout.

Body robust anteriorly, moderately compressed posteriorly, head rather depressed, broad behind eye, width equals head without snout. The eyes sub-dorsal, about half diameter apart. Head with numerous papillate flaps and ridges, in life covered almost to apex of these with thick mucus. Several transverse and longitudinal ridges on snout, some on cheek and opercles, one long transverse just behind eyes and behind this 2 along occiput, longer than eye. Both nostrils shortly tubular, fairly close together on ridge before eye, hinder midway between anterior and front of eye. Pores on head tubular, one each side of front of inter-orbital lateral to a short papillate ridge, one central in interorbital, two lateral just behind eye. From corner of mouth backwards 2 sub-parallel ridges, the lower on chin, within which is a series of 11-12 short transverse papillate ridges on each side, inside these a short double papillate ridge on front of chin. Gillopenings barely exceed pectoral base. No rakers or a feeble rudiment on upper arch, one in angle and 5 in front graduated shorter, all but apices embedded in tissue.

Dorsal insertion variably above base to $\frac{1}{4}$ along pectoral, 1st lower than 2nd fin, spines variable, 2nd-4th subequal, longest, apex of 6th sometimes free from membrane, which variably reaches base or up to $\frac{1}{2}$ height of second dorsal. Last spine of 1st fin often reaches beyond origin of 2nd, this latter about midway between caudal base and eye. Anal slightly behind 2nd dorsal, about same height. Pectoral about equals head, broad, rounded or sub-acute, apex reaches about level of 2nd dorsal origin, all rays divided. Pelvics adjacent, but separate, sometimes a low basal membrane, rays all divided, in juveniles reach far short of vent, in adults near vent. Caudal rounded, always distinctly less than head.

Mouth rather small, oblique, lower jaw projects, maxilla barely reaches below front of eye. In each jaw a moderately wide band of 4-5 series of villiform teeth, an outer single wide-spaced series of caniniform teeth, all largely embedded in spongy tissue. In lower jaw a few inner teeth enlarged, retrorse. Palate edentate. Tongue rounded or subtruncate.

Whole body scaly, cycloid anteriorly, including chest, pectoral base, and belly from about level of anus, on flank they become ctenoid but upper series below dorsal remain cycloid almost to end of fin. Scales become larger and the ctenae more prominent posteriorly, last few median scales near base of caudal largest, with 24-30 ctenae. From 2nd dorsal anteriorly the scales are smaller, cycloid and more embedded, predorsal scales barely visible, the few just behind eyes largest. Embedded cycloid scales on cheek and opercle, but interorbital and muzzle naked. A few indistinct transverse papillate ridges on body in adults.

Colour: live; olive to yellow-brown, mottled, edge of scales often darker, highly variable within this range. The dorsals basally olive, distally yellow, with black spots, anal and caudal similar. Pectoral yellowish, barred, throat yellow. Preserved, brownish, markings as above.

Described from numerous specimens, 20-70 mm. in length, from Bazaruto (20°S) northwards all along the E. African coast, at Zanzibar, Pemba, and all islands to Seychelles, found in coral from low tide mark down, usually in several fathoms, almost always taken by explosives, the type, 60 mm. in length, from Pinda, P.E.A., in this Department.

There has clearly been widespread confusion in species, and I cannot find one sufficiently clearly described to which my specimens can with certainty be assigned. They are, therefore, described in detail and arbitrarily named as new. It is likely that *hasseltii* Bleeker, 1851; *mucosus* Gunther, 1871; *insolita* Whitley, 1928 and others are all identical.

Mucogobius bifasciatus n. sp.

D VI+I 10. A I 9. P 15. V I 5. 40 series of scales, 17-18 from anal origin up. 16 predorsal. About 9 short gillrakers on lower limb of front arch.

In percent of standard length: total length 134; depth 19; head 33; width of head 20; pectoral 31; pelvic 24; 1st dorsal spine 14; 3rd 19; 5th 14; longest dorsal ray 18; depth peduncle 11. Snout tip to: dorsal origin 38; 2nd dorsal origin 60. Head 3, depth 5.2 in body length. Pectoral 1.1, pelvic 1.3 in head. Width of head 1.6 in length. Eye 5.2 in head, 1.2 in snout.



Fig. 7. *Mucogobius bifasciatus* n. sp. Type, 30 mm.

Body elongate, compressed posteriorly, head from above rather pointed, depressed at snout, no barbels or spines on head, several low papillate or ciliate flaps. Eyes very close together, interorbital a fine bony ridge. Anterior nostril over upper lip as small low tube, posterior nostril a pore before eye. Gill opening lateral but extends somewhat below pectoral base, rakers short sharp points.

First dorsal inserted behind pectoral base, 2-4th spines longest, membrane from 6th does not reach 2nd fin, which is about as high as 1st, almost body depth. Anal inserted opposite soft dorsal, slightly lower. Pectoral rounded, reaches beyond anal origin, uppermost and lowest rays simple, rest divided. Pelvics narrow, pointed, inner ray simple, others divided, do not reach vent, bases almost contiguous, fins separate. Caudal rounded, almost as long as head.

Mouth moderate, oblique, reaches below front of eye, lower jaw projects slightly. Fine villiform teeth in bands of 4-5 series in each jaw, an irregular series outside enlarged, some inner teeth also. Tongue deeply emarginate, free.

Scales all cycloid, cover body and nape to behind eyes, anterior predorsal scales larger. Body scales small to 2nd dorsal origin, then become rapidly larger, one before caudal base largest. Snout and chin naked. On cheek 4-5 and on opercle 4 regular series of cycloid scales, non-imbricate.

Colour: live; light brownish olive, fins similar, a broad orange-brown bar below 1st dorsal, extending onto front of fin, a 2nd similar, more oblique, between soft dorsal and hind part of anal, extending into basal front of dorsal and over hind part of anal. Brownish mottlings on nape, preopercle and opercle. Snout and chin brown.

Described from the holotype, 30 mm. total length, Pemba, from coral in 6 fathoms. Related to *liolepis* Koumans, 1931 from the central Pacific, also with cycloid scales, this differs in fewer scales, and greatly in markings.

Mucogobius liolepis (Koumans), 1931
(Pl III, K)

Callogobius liolepis Koumans, 1931, 75. Koumans 1953, 97.

D VI+I 9. A I 9. P 18. 45 scales, Tr. 12, predorsal 20. 1+1+5 gillrakers. In percent of standard length: total length 117; head 32; depth 23; eye 4; interorbital 3; snout 8; pectoral 22; pelvic 19. Head 3.1, depth 4.2 in body. Eye 7.5 in head, 1.8 in snout, 1.3 times interorbital.

Body robust, head depressed, with numerous papillate flaps and ridges, some also on shoulder and nape; a number of vertical series along flanks to caudal base and some minute series on caudal. Gill openings slightly exceed pectoral base, rakers feeble. Mouth moderate, maxilla does not reach below eye. In each jaw a band of fine teeth, outer series enlarged.

1st dorsal inserted $\frac{1}{2}$ along pectoral, 3rd and 4th spines longest, fins separate, soft rays higher than spines. Anal inserted slightly behind soft dorsal. Pectoral reaches 2nd dorsal origin, all rays divided. Pelvics barely reach vent. Caudal rounded, distinctly shorter than head. Scales all cycloid, those before 2nd dorsal origin more deeply embedded and smaller than those behind, those on nape and chest smaller, embedded concealed scales on cheek and opercle, not clearly imbricate, predorsal scaling ends just behind eye.

Colour: yellow brown, mottled and marbled, with 2 large darker areas across body, the 1st below 1st dorsal, another below 2nd dorsal, a 3rd across peduncle. Fins dusky, spotted, bars across pectoral and caudal.

Described from a single specimen from Pemba, 80 mm. in length. While this agrees closely with the general description of *liolepis* Koumans, in virtually every detail it resembles *flavobrunneus* (see above) so closely, (excepting only that scales are cycloid), that it is difficult to believe it a different species. It is notably larger than any specimens of *flavobrunneus* found, and in those continuation of the scales becomes less with growth, cycloid scales may be a feature of age. Concealed scales on cheek and opercle are present. Not previously found in the W. Indian Ocean.

10. Genus *Ophiocara* Gill, 1863

Gill 1863, 270.

Genotype *Eleotris ophiocephalus* Valenciennes, 1837. Elongate compressed body, head robust de-

pressed. Scales rather large, most on body ctenoid, in front and on head cycloid. Head scaly except muzzle, scales not enlarged. Mouth oblique, lower jaw projects, small teeth in bands, outer series enlarged, no canines. Gill openings lateral, rakers small, few. Pelvics widely separate, I 5. Dorsals well separated, VI+I 7-9; A I 6-9. Few species, 2 in W. Indian Ocean.

- A. 37-42 scales **porocephala**
 B. 30 scales **aporos**

Ophiocara porocephala (Valenciennes), 1837
 (Pl II, F. Pl III, G,H)

Eleotris porocephala Valenciennes 1837, 237. Day 1878, 314, Pl 65, fig. 8.

Eleotris ophiocephalus. Numerous records from East Africa, Madagascar, Mauritius, Comores, Seychelles.

Eleotris limosus Smith 1936, 52, fig.

Ophiocara limosus Smith 1949-53, 340, Pl 69, fig. 941.

Ophiocara porocephala Koumans 1953, 343.

Eleotris madagascariensis Valenciennes, 1837, 240. Sauvage 1875-91, 378, Pl 18, fig. 1.

Numerous other references over whole area.

With characters of the genus. D VI+I 8-9. A I 6-7. P 14-15. 37-42 scales; Tr. 11-13, 18-26 predorsal. 3-4+1+11 gillrakers. Depth 4.1-4.3, head 2.7-3.3 in body. Eye 4-6.5 in head, 1-2.4 in interorbital, more than or equal to snout. Head depressed, interorbital wide. Front nostril a short tube over side of mouth, hinder an irregular pore before eye. Gillrakers well developed, in front graduated shorter. Rows of papillae on head, cheek and chin, prominent pores on head. Mouth moderate, maxilla to below middle of eye. First dorsal low, 2-4th spines largest, soft fin higher, rays increase rearwards. Anal inserted slightly behind and similar to soft dorsal. Pectoral 1.1-1.4 in head, tip reaches 2nd dorsal origin, one upper and lowest rays simple, remainder branched. Pelvics 1.2-1.4 in head, reach to or beyond vent. Caudal less than to as long as head, broadly convex as expanded. Scales ctenoid to shoulder, but a few along dorsal base, all on nape, head, pectoral base, belly and chest cycloid. Whole head except muzzle scaly. Colour: live; dark olive green or blackish, fins dusky or dark violet, 2nd dorsal and caudal with dark spots. Margins of fins sometimes orange. Young with several irregular yellowish cross bars, turn silvery in formalin (Pl II, F). Preserved, uniform dusky, spots on fins. Described from 18 specimens, 65-270 mm. in length, from Durban to Shimoni, almost all islands to Seychelles. Throughout the temperate Indo-Pacific, except far E. Pacific, usually in cloudy water. A variable species, especially when large. Not yet found in the Red Sea.

Ophiocara aporos (Bleeker), 1854
 (Pl III, B)

Eleotris aporos Bleeker 1854, 59.

Eleotris macrolepidotus (non Bloch, 1801) Steindachner 1881, 243. Sauvage 1875-91, 521.

Eleotris macrolepidota (non Bloch, 1801) Pellegrin 1914(a), 112; and 1914(b), 229; and 1933, 124, fig. 70.

Ophiocara aporos Koumans 1953, 346, fig. 84.

With characters of the genus. No specimen available. D VI+I 8-9. A I 9. P 14-15. About 30 scales; Tr. 10-11, predorsal 13-17. Depth 4-4.7, head 3.2-3.5 in body. Eye 4-5.5 in head, 1-2.2 in interorbital, about equals snout. Head depressed, interorbital flat. Fins much as in **porocephala**. Scales ctenoid to shoulder, those on nape and head cycloid, head scaly except muzzle. Said to be brilliant in life, green and gold, with rows of golden spots along side to caudal, 2 green stripes from eye to opercle, golden between. Dorsal and anal with golden spots, margin red or yellow. Black spot on caudal base. Eye dark red. Preserved: dusky, 2-3 stripes from eye down and back, a vague stripe along tail to caudal. Freshwater and estuaries, E. Indies and W. Pacific, also India, recorded from Madagascar, but it is doubtful if it really occurs in the W. Indian Ocean.

11. Genus **Calumia** nov.

Genotype **Calumia biocellata** nov. Robust body, head depressed, snout flattened. Body and head except muzzle scaly, most on body ctenoid, on head cycloid and notably enlarged. Gill openings wide, far forward, rakers few. Dorsal and anal short, peduncle long. Pectoral rays simple. Pelvics well separated, I 5. Related to **Ophiocara** but clearly distinguished by scaling, larger gill opening and pectoral rays all simple. A single species.

Calumia biocellata n. sp.
 (Pl II, K)

D VI+I 7. A I 6-7. P 16. V I 4, 1=5. 24-26 series of scales; Tr. 8, 6-7 predorsal. 2+5 gillrakers.

In percent of standard length: total length 115; depth 22-24; head 30; width of head 23; pectoral 24; pelvic 30; 1st dorsal spine 12.5; 3rd 20; 5th 11.5; longest dorsal ray 29; depth peduncle 12. Snout tip to: dorsal origin 36; 2nd dorsal origin 55. Head 3.3-3.4, depth 4.1-4.4 in body length. Pectoral 1.2, pelvic 1.0 in head. Width of head 1.3 in its length. Eye 4.2-4.4 in head, 1.4 times snout and 1.1-1.2 times interorbital. Body robust, compressed posteriorly. Head depressed, slopes towards flattened snout. Interorbital wide. Nostrils close together, anterior with tubule equal to interspace, posterior a pore close before eye. Two series of small papillae each side of snout, outer within and close to nostrils. Series of papillae on side of head as shown in figure, a close-set series each side of chin below, a short one each side of mentum and another

each side outside this. Gill membranes united forward on chest, form a short fold across isthmus, attached below. Two short stout gill rakers on upper limb, 4-5 short and slender below.

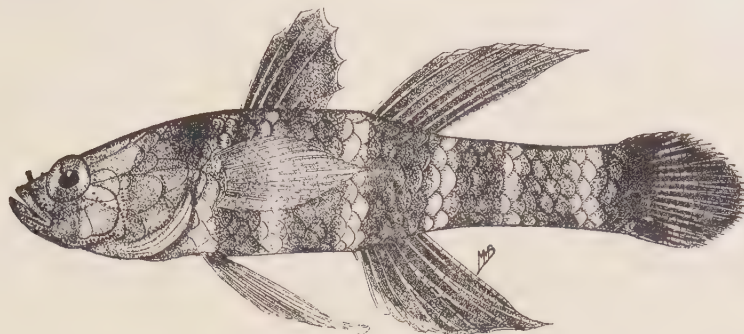


Fig. 8. *Calumia biocellata* n. sp. Type, 35 mm.

Dorsal inserted over hind margin of pectoral base or slightly posterior. Spines increase to 3rd, slightly less than body depth, fins completely separate, soft fin higher than 1st, rays increase to 5th, as long as head, hind end of fin pointed. Anal inserted about opposite 2nd dorsal origin, shape similar to 2nd dorsal, little shorter. Pectorals pointed, reach beyond anal origin, 8th ray from above longest, rays all simple, longest ray rarely bifurcate apically. Pelvic bases widely separate, first 4 rays bifurcate, increase to 4th, reaches beyond anal origin, 5th ray simple, shorter. Caudal rounded, $\frac{2}{3}$ head length.

Mouth small, terminal, oblique, lower jaw projects, maxilla about to front of eye. In upper jaw a band of about 7 series of fine villiform teeth, outer series enlarged, well separated, a few inner teeth enlarged, same in lower jaw, but a series of larger recurved teeth in front. Palate edentate, tongue free, rounded. Whole body and head scaly except muzzle. Scales large, those on head, belly, pectoral base and chest cycloid, remainder ctenoid. Scaling extends over basal 4th of caudal, other fins naked. Head scales enlarged.

Colour: in life as in Plate II; preserved, as in Fig. 8.

Described from 12 specimens, 22-36 mm. in length, from Bazaruto, Pinda, Mozambique, Ibo, Zanzibar, Pemba and Shimoni, the type, 35 mm. in length, from Zanzibar, in this Department. A characteristic and strikingly marked small Eleotrid, taken by poison at low tide in pools, muddy or weedy areas.

12. Genus *Trimma* Jordan & Seale, 1906

Jordan & Seale, 1906, 381, 391.

Genotype *Trimma caesiura* J & S, 1906. Body covered with about 25 series of mostly ctenoid scales, nape and chest scaly, head naked. Small oblique mouth, fine teeth in bands. Gill openings wide, to below eye, rakers well developed. V I 5, normal. Caudal truncate. Tiny fishes, only 2 species known, the type from Samoa, a 2nd from the W. Indian Ocean.

Trimma naudei Smith, 1956
(Pl II, B)

Smith 1956, 828, fig. 5.

With characters of the genus. D VI+I 8. A I 8. P 16. V I 5. 24-25 scales, Tr. 8, predorsal 6-8. Gill-rakers 3+1+13-14. Eyes close together. Front nostril low tube, hinder a pore, close behind. Outer teeth enlarged. 2nd dorsal spine prolonged. Pectoral with 4 upper and 8-9 lower rays simple, inner 3-4 divided. Inner pelvic ray simple, others divided, fin reaches beyond anal origin. Scales (2) on pectoral base, front of belly, and chest, cycloid. A single cycloid scale below skin on upper front of opercle. Colour: live: as shown in Pl II; preserved, whitish, with irregular dusky areas on body. Dorsals with basal dusky bar, soft fin with another above and a spot apically on each ray. Caudal with few dusky marks, other fins light. 22-27 mm. in length, from coral rubble at Mahé, Aldabra, and Pinda, Mozambique.

13. Genus *Eleotris* Schneider, 1801

Bloch Schneider 1801, 65.

(*Gobiomoroides* Lacepede, 1800. *Epiphthalmus* Rafinesque, 1815. *Culius* Bleeker, 1856).

Genotype *Eleotris gyrinus* Valenciennes, 1837. Robust body covered with small scales, anteriorly cycloid, hinder ctenoid. Head depressed, scaly, except muzzle. A downwardly curved spine at preopercle angle. Gill openings lateral only. Teeth in bands, outer enlarged, no canines. V I 5. Found in all tropical seas, 2 related species in our area, distinguished by scale count and gill rakers, *fusca* with 9 and *melanosoma* with 6 lower rakers. (See Appendix).

Eleotris fusca (Bloch Schneider), 1801
(Pl III, J)

Poecila fusca Bloch Schneider, 1801, 453. Records and references in W. Indian Ocean voluminous, synonyms for specimens from this area are: *nigra* Quoy & Gaimard, 1824; *mauritanus* Bennett, 1831; *fornasini* Bianconi, 1858; *soaresi* Playfair, 1866; *cavifrons* Day, 1878; *klunzingeri* Pfeffer, 1893.

With characters of the genus. D VI+I 8. A I 8. P 15-18. 60-65 scales: Tr. 16-18, 33-35 from origin 2nd dorsal to caudal base, about 50 predorsal. 9 gillrakers. Depth 4-5, head 3-3.4 in body. Eye 5-6 in head, equals snout, 1-1.3 in interorbital. Front nostril a short tube at lip, hinder a pore with low rim above front of eye. Head with numerous lines of papillae, a double cross hatched series each side of snout, many above eye, a cross line behind interorbital, numerous series at right angles on side of head, groove from eye to opercle with line of pores. Numerous series on chin. Gill openings lateral. 1st slit restricted by membrane for one-fifth anteriorly, rakers normal, moderate, slender. A deep groove in shoulder girdle under operculum before lower edge of pectoral base. Mouth reaches below front third or middle of eye. First dorsal low, 3-4th spines longest, soft fin little higher. Anal inserted slightly behind dorsal. One upper and 1 lower pectoral rays simple, fin rarely reaches near 2nd dorsal origin. Pelvics shorter, well separated, not to vent. Caudal rounded. Body scales ctenoid, cycloid at base of 1st dorsal and forward on shoulder, nape and head, also cycloid on pectoral base, belly and chest. Interorbital scaly to hind nostril. Colour: live; usually sombre, brown to black, often narrow interrupted dark lines along scale rows. A black spot in axil of pectoral. Dorsal and anal often with 3-4 dark bars, tipped orange. Preserved, almost uniform dull brown, sometimes dark marks along sides.

Described from several specimens, 15-180 mm. in length. One of the most widespread species, found almost everywhere from Africa to central tropical Pacific, prefers estuaries and dirty water, sheltering under stones, in shells and holes. We have found it from 32°S northwards along E. Africa and throughout the W. Indian Ocean.

Eleotris melanosoma Bleeker, 1852

(Pl III, F)

Bleeker 1852, 705. Koumans 1953, 297.

With characters of the genus. Almost exactly like **fusca**, except that I find fewer scales and gillrakers. 55 series of scales; Tr. 15; 40 predorsal, 28 from 2nd dorsal origin to caudal base. 1st gill slit restricted by membrane about $\frac{1}{4}$ in front, 6 moderate gillrakers, end at membrane. Colour: live; almost black, margin of dorsals yellowish. Preserved; black.

Described from a single specimen, 100 mm. in length, from inner harbour, Ibo, Mozambique. Known from a wide area of the central tropical Pacific and India, not before found in the W. Indian Ocean.

14. Genus **Eleotriodes** Bleeker, 1858

Bleeker 1858, 212.

(**Calleleotris** Gill, 1863. **Valenciennesia** Bleeker, 1874. **Salarigobius** Pfeffer, 1893. **Gergobius** Whitley, 1930).

Genotype **Eleotris sexguttatus** Valenciennes, 1837. Elongate compressed body covered with small, mostly ctenoid scales, nape scaly. Head naked, snout blunt. Eyes forward and high on head. Front nostril with low rim, hinder a pore. Mouth moderate, teeth in upper jaw uniserial, on each side in front usually 4 curved caniniform teeth, outermost largest, on side of jaw a single series of smaller sharp teeth, apices rough. In lower jaw 2 series in front, outer larger, outside these a larger outward flaring canine, teeth on side of jaw uniserial, smaller. Tongue rounded. Gill openings little more than pectoral base, 3-4 rakers on hind part of lower limb. A fleshy accessory branchial organ in upper part of cavity. Caudal rounded. V I 5, bases separate but with low basal connecting membrane. A few moderate sized species, tropical Indo-Pacific, 4 in our area, all illustrated here, distinguished by colour and markings.

Eleotriodes sexguttatus (Valenciennes) 1837

(Pl II, G)

Eleotris sexguttatus Valenciennes 1837, 254.

Eleotris sexguttata Gunther 1861, 130. Day 1878, 311.

Eleotris lantzii Thominot 1878, 256. Sauvage 1875-91, 381, Pl XLI, fig. 6.

Salarigobius stuhlmanni Pfeffer 1893, 13, Pl 3, figs. 6, 7.

Eleotriodes sexguttatus Koumans 1953, 339, fig. 82. Steinitz & Ben-Tuvia 1955, 10. Roux-Estève 1956, 101 (Red Sea). Smith 1956, 817 (Aldabra).

With characters of the genus. D VI+I 12. A I 11-12. P 19-20. About 90 scales, Tr. 43. 0+3 gillrakers. Depth 5-5.5, head 3.5 in body. Eye 4.2-4.6 in head, 1.5-2 times interorbital. Only 3 fleshy digitate rakers just before angle on 1st arch, about 9 inwardly directed fleshy rakers on 2nd arch. Mouth reaches below eye. 3rd dorsal spine longest, higher than soft fin, membrane from 6th barely reaches origin of 2nd fin, anal fin origin about opposite. Pectoral reaches almost below 2nd dorsal origin, one upper and 1-2 lower rays simple, pelvics slightly shorter, not to vent. Caudal rounded cuneate. Scales ctenoid, those in front on nape, above opercle, are cycloid, also on belly and chest, these much smaller. Pectoral base quite naked. Colour: live; as shown in Pl II: preserved; uniform milky white, apex at 3rd dorsal spine black. Described from numerous specimens, 40-100 mm. in length, from Bazaruto (20°S), Mozambique, northwards in E. Africa, and at most islands to Seychelles, not previously recorded there. Known from Red Sea, tropical Indian Ocean, East Indies, Central Pacific. **Salarigobius stuhlmanni** Pfeffer is clearly a juvenile of this species, abnormal with 5 spines in 1st dorsal or not properly examined.



PLATE I

A and B. *Ptereleotris tricolor* Smith. A, 50mm; B, 118mm. C. *Ptereleotris microlepis* (Bleeker). 108mm. D. *Eleotriodes strigatus* (Brouss). 135mm. E. *Pogonoculius zebra* Fowler. 91mm. F. *Laccoeleotris lineopinnis* Fowler. 115mm. H. *Eviota stigmatiperon* n.sp. Type, 20mm. J. K. L. *Eviota verna* n.sp. J., Type, male 23mm. K, female 22mm; L, female 23mm.



PLATE II

A. *Amblyeleotris (Fereleotris) delicatulus* n.sp. Type, 56mm. B. *Trimma naudei* Smith. Type, 27mm. C. *Mucogobius flavobrunneus* n.sp. Type, 60mm. D. *Prionobutis koilomatodon* (Bleeker). 40mm. E. *Eleotriodes helsdingenii* Bleeker. 164mm. F. *Ophiocara porocephala* (Val.). 43mm. G. *Eleotriodes sexguttatus* (Val.). 70mm. H & I. *Heteroeleotris zonatus* (Fowler). 55mm. J. *Asterropterix semipunctatus* (Ruppell). 55mm. K. *Calumia biocellata* n.sp. Type, 35mm. L. *Cryptocentrops exilis* n.sp. Type, 45mm.

Eleotriodes helsdingenii Bleeker, 1858
(Pl II, E)

Eleotriodes helsdingenii Bleeker, 1858, 212. Koumans 1953, 335.

Calleleotris helsdingenii Smith, 1949-53, 340, Pl 73, fig. 943.

With characters of the genus. D V+I 11. A I 11. P 22-24. About 130 scales; Tr. 35. 0+4 gillrakers. Depth 5, head 3.5 in body. Eye 4.7-5 in head, 1.4 in snout, 1.2 times interorbital. On 1st gillarch before angle 3 digitate rakers and 1 smaller, front of arch naked, 10 frilled fleshy rakers on 2nd arch, directed inwards. Mouth reaches middle of eye. 3-4th dorsal spines longest, membrane from 6th spine reaches base of 2nd fin. Hind ray of soft dorsal and anal prolonged. One upper and 3 lower rays of pectoral simple, fin reaches near anal origin, pelvics shorter, not to vent. Caudal with 2 rays prolonged (Pl II) in adults. Scales on nape to above hind margin of opercle, deeply embedded, those on belly, chest and pectoral base cycloid, rest ctenoid. Only exposed part of pectoral base scaly.

Colour: live; brilliant as shown in Pl II; preserved; milky yellow, dark marks as in Pl II. Described from a specimen, 140 mm. total length from Delagoa Bay, also seen in a deep pool at 31°S in S. Africa, not captured. A rare species, known from Japan and E. Indies. A juvenile, 38 mm. in length, from Pinda, Mozambique, has the blotch on the dorsal and the two stripes along the body, but the snout is much shorter and the tail is broadly but feebly bilobed with a central emargination, without filaments.

Eleotriodes strigatus (Broussonet), 1782 (Pl I, D)

Gobius strigatus Broussonet 1782, 1, Pl I.

Eleotris strigata Bloch Schneider 1801, 65. Valenciennes 1837, 251. Gunther 1861, 131. Gunther 1877, 190, Pl III, fig. E.

Eleotriodes strigatus Koumans 1953, 334. Fourmanoir 1954, 206. Roux-Estève & Fourmanoir 1955, 200. Smith 1956, 817.

Valenciennesa strigata Herre 1927, 78.

D VI+I 17-18. A I 16-18. P 21-22. About 110 scales, Tr. 35. 1+7 gillrakers. Depth 4.5-5, head 3.4-3.8 in body. Eye 4.2-5 in head, 1-1½ times interorbital. On 1st gillarch a rudiment in angle, then 4 long rakers, and 2 shorter, another rudiment in front. On lower limb of 2nd arch 13 inwardly directed fleshy rakers.

2-4th spines in 1st dorsal filamentous, membrane from last reaches base of 2nd fin. Anal origin slightly behind that of 2nd dorsal. Pectoral with 1-2 upper and 2-3 lower rays simple, reaches below 6th dorsal spine, pelvics slightly longer, filamentous tip of 4th ray reaches near vent. Caudal rounded. Scales on nape deeply embedded, extend to above mid-opercle, those in front, on pectoral base, belly and chest, cycloid, remainder ctenoid. Scales only on front of pectoral base, hidden by operculum.

Colour: as shown in Pl I; preserved, uniform milky yellow, a curved dark bar below eye to opercle, inside of gill cavity black, shows on lower opercular area. Described from numerous specimens 36-160 mm. in length, now found in E. Africa from 12°S northwards, at Aldabra and Seychelles, mainly in sand at low tide level, rather rare. Otherwise known from most of the central tropical Indo-Pacific.

Eleotriodes wardii Playfair, 1866 (Pl III, E)

Playfair, 1866, 73, Pl IX, fig. 3.

No specimen available, the following compiled from Playfair. D VI+I 12. A I 12. 95 scales. Depth 7.5, head 4.5 in total length. Snout larger than eye, which is 4 in head. Eyes close together. Lower jaw larger, outer series of teeth slightly enlarged, a small canine at side of lower jaw. Head naked. Each dorsal spine produced as short filament, caudal acutely rounded. Colour pearly, with 4 dark edged bars, the 1st below front dorsal spine; 2nd between dorsal fins; 3rd below end of soft dorsal; 4th across caudal. Rudimentary band in the interspaces between each pair, 1st across neck. A straight silvery blue band from lower part of maxillary to upper angle of operculum, and a faint blue line (fades after death) from lower front margin of eye to middle of jaw. 1st dorsal brownish, with some white marks and a large black white-edged ocellus at apex. 2nd dorsal yellowish white, a blackish band along middle and 2 black spots on base. Anal shaded with yellow, white and pale brown, with a dark-brown margin.

Known only from the type, 3½" long, from Zanzibar. I suspect this to be identical with **muralis** Quoy and Gaimard (in C & V, 1837, 253, Pl 357), and both are likely merely variants of **sexguttatus** Valenciennes, 1837.

15. Genus **Amblyeleotris** Bleeker, 1874

Bleeker 1874, 373.

(**Pteroculiops** Fowler, 1938).

Genotype **Eleotris periophthalmus** Bleeker, 1853. Elongate compressed body, with small scales, cycloid in front, ctenoid posteriorly. Head and most of nape naked. Narrow band of fine teeth, few widely separated canines in each jaw. Gill openings lateral or slightly more. Eye high up, far forward. V I 5. 2 species previously known, the type, from Java, and **Pteroculiops guttatus** Fowler, 1938 from Philippines, clearly congeneric. One doubtful record of type species from Eritrea, Red Sea. A new species from Zanzibar falls here, but merits at least subgeneric rank:

- A. Dorsal and anal lower than body. Pelvics normal. Scales on nape. **Amblyeleotris**
- B. Dorsal and anal much higher than body. Pelvics thread-like. Nape naked. **Fereleotris nov.**

Amblyeleotris (A) periophthalmus (Bleeker), 1853

(Pl III, M)

Eleotris periophthalmus Bleeker 1853, 477. Borsieri 1904, 207.

Amblyeleotris periophthalmus Koumans 1953, 341, fig. 83.

No specimens seen, presence in W. Indian Ocean doubtful. With characters of the genus. D VI+I 12. A I 12. About 70-80 scales. Tr. 22. Depth about 6, head 4 in body length. Eye 4 in head. Pectoral, pelvic and caudal subequal to head. Scales on side of nape. Stated to have head and chest pink, back and sides yellow, violet-margined red ocelli on head, 6 pink bars across body. Dorsal fins greenish, margin orange, membrane dark with light spots. Anal basally yellow with blue spots, distal half reddish with 3 blue lines. Pectoral base yellow, fin pink. Pelvic rays orange, membrane bluish. Caudal orange, lower edge violet. Attains at least 75 mm. E. Indies: Red Sea (Eritrea)?

Subgenus **Fereleotris nov.**, as defined above.

Amblyeleotris (Fereleotris) delicatulus n. sp.

(Pl II, A)

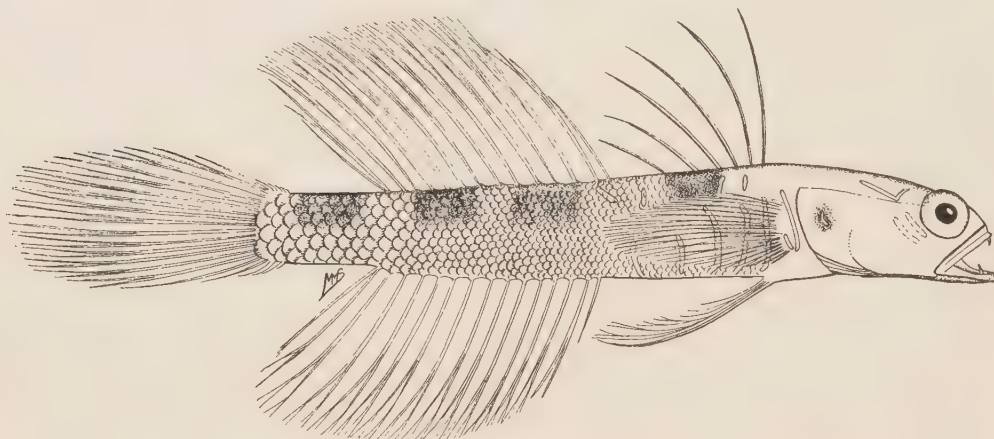


Fig. 9. **Amblyeleotris (Fereleotris) delicatulus n. sp.**, Type 42 mm.

D VI+I 13. A I 14. P 21. V I 5. About 50 series of scales, Tr. about 17 from anal origin up. Gillrakers 0+1+7. Body compressed, also head, tapers little to tail. Eyes close together, narrow ridge between, snout blunt, less than eye. Gill openings extend below preopercle ridge, rakers short, none on upper limb. No papillae visible on head. In percent of standard length: depth 17; head 26; eye 7.5; pectoral 26; pelvic 28; 1st dorsal spine 22; 2nd spine 24; 5th spine 14; 1st dorsal ray 24; 11th dorsal ray 28; depth peduncle 10. Head 3.8, depth 6 in length. Eye 3.5 in head. Pectoral equals head, pelvic 1.1 times head.

Mouth large, fairly oblique, maxilla reaches below hind part of eye. In upper jaw a band of 2-3 series of small recurved teeth, in front 2 pairs of widely and equally separated canines, inner pair smaller. 2-3 series of small recurved teeth round front of lower jaw, outer series in front larger, on side of mandible a larger erect recurved canine, behind this uniserial small teeth. Palate edentate. Tongue truncate. Dorsal spines slender, 2nd longest, 1.4 times body depth, 1st dorsal separate. Soft rays apically finely divided, more so posteriorly, end of fin free from body. Anal inserted slightly behind dorsal origin, about similar to soft dorsal. Caudal broken, longer than head. Pectoral pointed, lower mid-ray longest, reaches beyond anal origin, all rays divided, apically thread-like. Pelvic bases adjacent, separate, rays all divided, thread-like, 5th inner longest, reaches to base of 3rd anal ray.

Body covered with rather small scales, longer than wide, obsolete on shoulder, those in front cycloid, posteriorly become ctenoid and larger, most with single row of long ctenae. Nape and head naked.

Colour: after death: as shown on Pl II. Preserved: whitish, as shown.

Described from the fragile holotype, 50 mm. total length, from a net at Zanzibar, damaged, many scales gone.

16. Genus **Cryptocentrops nov.**

Genotype **Cryptocentrops exilis n. sp.** Elongate compressed body covered with minute scales, ctenoid on hinder half, cycloid in front. Head and most of nape naked. Gill openings wide, to below eye, rakers moderate. Mouth large, in each jaw small teeth in bands, outer row enlarged, canines in side of lower jaw. Pelvics I 5, bases narrowly separated. Dorsal and anal low. Appears to be well distinguished from all other genera, clearly related to the Gobiid **Cryptocentroides** Popta, 1922 in which the pelvics are fully united. Only the holotype known.

Cryptocentrops exilis n.sp.

(Pl II, L)

D VI+I 12. A I 12. P 1, 14, 1 = 16. V I 5. About 70 series of scales; Tr. 28-30. Gill rakers 3+1+10.

In percent of standard length: total length 122; depth 18; head 27; width of head 18; pectoral 26; pelvic 25; 1st dorsal spine 12; 4th 13; longest dorsal ray 15; depth peduncle 11.5. Snout tip to dorsal origin 33, 2nd dorsal origin 54. Head 3.7, depth 5.5 in body length. Width of head 1.5 in length. Eye 4.2 in head, 1.3 times snout. Body elongate, compressed, snout short and blunt, abruptly descending before eyes, latter virtually adjacent, top above dorsal profile. Nostrils closely adjacent, anterior shortly tubular, posterior a pore close before eye. No obvious pores on head except one median in front of interorbital where orbits diverge. No obvious papillae on head, no crest on nape. Opercular flap covers most of pectoral base. Gill openings wide, gill membranes largely free, attached to isthmus far forward below hind margin of eye. Gillrakers moderate, one in angle and 5-6 in front well developed, others reduced, anterior 3 knoblike.

First dorsal inserted just behind pectoral base, 3-4th spines longest, fin low, much less than body depth, membrane from last spine barely reaches base of 2nd fin, soft rays increase to 10-11th. Anal inserted below 2nd dorsal soft ray, rays increase to 11th, longest. Pectoral rounded, reaches near anal origin, one upper and one lower ray simple, rest branched apically. Pelvic rays increase to 4th, all branched, 5th slender, shorter than 4th, bifurcate, fins reach to anal origin; fins quite separate but bases closely adjacent. Caudal rounded, shorter than head.

Mouth large, subhorizontal, lower jaw projects slightly, maxilla extends below hind margin of eye. Upper lip villose within. In upper jaw a single irregular external series of about 15 recurved slender caniniform teeth on each side, those in front largest, inside these a narrow band of small teeth, retrorse in front, uniserial on sides. In lower jaw in front a few recurved caniniform teeth, inside these a cluster of fine villiform teeth, latter continued as a band of 3-4 series along side of jaw: on each side laterally 1-2 large recurved canines. Palate edentate. Tongue subtruncate, free. Whole body scaly, head naked, no scales on midline of nape. Scaling on shoulder begins about over hind preopercle margin, scales extremely fine, embedded, cycloid. They remain small and cycloid till near hind end of 1st dorsal, then ctenoid. Rows so arranged in front that free margin of scales is ventral and this gradually changes rearwards until the scales are normally imbricate. Scales on belly and chest cycloid, deeply embedded, none on pectoral base.

Colour: in life, as shown on Plate II. As preserved, yellowish, darker marks, as shown in Pl II, brown.

Described from the holotype, 45 mm. in length, from a weedy tide pool at Chumbe, Zanzibar, now in this Department. This fish is assigned with some doubt to the Eleotridae, since while the pelvics are completely free the bases are very closely adjacent.

17. Genus **Xenisthmus** Snyder, 1908

Snyder 1908, 105.

(**Gignimentum** Whitley, 1933. **Platycephalops** Smith, 1956).

Genotype **Xenisthmus proriger** Snyder, 1908 from Okinawa. Elongate cylindrical body covered with small scales. Head depressed, mostly naked. A knob and groove on shoulder girdle beneath operculum. Fine teeth in bands, no canines. Pelvics I 5. Possibly only one widespread species, 2 listed here.

- | | |
|-------------------------|------------------------|
| A. 12 dorsal rays | africanus n.sp. |
| B. 11 dorsal rays | polyzonatus |

Xenisthmus africanus n.sp.

Platycephalops polyzonatus (non Klunzinger), Smith 1956, 823, fig. 3.

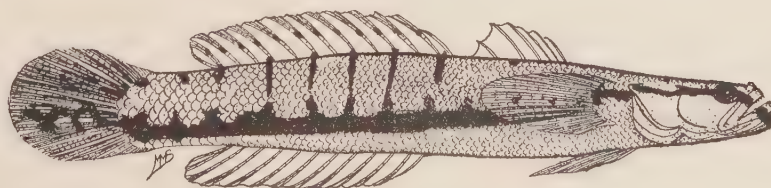


Fig. 10. **Xenisthmus africanus n.sp.** Type, 38 mm.

D VI+I 12. A I 11. P 1, 14, 1. V I 4, 1. C 2, 14, 1. Scales about 60, Tr. 20-21 from anal up, 18-20 predorsal. 4+12 gillrakers.

In percent of standard length: total length 118; depth 16-17; head 23-24; eye 3.5-7; interorbital 1.1; snout 4, postorbital 13; 1st dorsal spine 4; 5th 7; 6th 3.5; 1st dorsal soft ray 9; 6th 10; anal spine 5.5; 1st anal ray 8.5; 6th anal ray 9; base of soft dorsal 36; base of anal 30; pectoral 22-24; pelvic spine 4; pelvic length 15-16; depth peduncle 10-11; Snout tip to: dorsal origin 30-34; 2nd dorsal origin 48.

Front nostril tubular, over lip, hinder above front of eye, with low rim and cirrus. Gill openings wide, rakers slender, lower directed outwards. Mouth oblique, chin projects, maxilla to middle of eye. In each jaw a band of fine villiform teeth, 2-3 series on sides, in upper only widen to 5-6 in front, no canines. Tongue bilobed. Dorsals separate, low, also anal, both end well before caudal. Anal origin close behind origin 2nd

dorsal. Uppermost and lowest pectoral ray simple, others branched; fin does not reach level of anus. Pelvics well separated, short, 5th inner ray short and simple, others divided. Scales small, imbricate only on hinder half of body, cycloid in front to level of hind half of 2nd dorsal, where they become ctenoid, more so rearwards. Nape scaly to above preopercle margin, but occiput and most of head naked, 3-4 small scales below eye and 3-4 along upper part of opercle.

Colour: alive, most are opaque milky yellow with 11-12 light red brown cross bars of variable size, from mere lines to broader bars. Usually a row of darker spots along middle of body to lower part of caudal. A row of spots along middle of soft dorsal. A dark brown red bar from snout through eye to opercle thence variably to or through pectoral base, subcontinuous with row of spots along body. Irregular dark spots on caudal, the upper russet. Fins otherwise light. A few specimens show hardly any cross bars, but have a more or less continuous dark bar from snout through eye, pectoral base and along body to lower part of caudal, with odd dark spots above on caudal. Melanic variants have most of body black, the chin, chest and belly white; an area back from snout over nape and two-thirds along base of dorsal lighter. An area eye width behind eye especially dark, divided into 3 areas by lighter lines. Narrow margin of caudal, upper half of dorsal and most of rest of fins light.

Described from numerous specimens 20-38 mm. in length, found over a wide area of the W. Indian Ocean, from Bazaruto (21°S) northwards, at Zanzibar, Pemba, Mafia and Aldabra, living about low tide mark in sand and fine coral grit. The type, 38 mm. in length, from Pinda, Mozambique, in this Department. Originally identified as **polyzonatus** Klunzinger, 1871, from the Red Sea, not apparently seen since the original description. I have come to doubt the validity of this diagnosis and here name the species as new. At the same time it is not unlikely that **Heteroleotris clara** Jordan & Seale, 1905 from Samoa; **Xenisthmus proriger** Snyder, 1908 from Japan, **Gignimentum penicillum** Whitley, 1933 from New Hebrides; **polyzonatus** Klunzinger, 1871 and the E. African form here described, may prove to be the same. Whitley (Rec.Aust.Mus. 1933, XIX, 88) states V I 4 for **penicillum**, possibly in error.

Xenisthmus polyzonatus (Klunzinger), 1871

Eleotris polyzonatus Klunzinger, 1871, 482.

Stated to have D VI+I 11. A I 11. L. 1 60. Depth $8\frac{1}{2}$. Head $4\frac{1}{2}$. The eyes well separated. Mouth oblique, maxilla to below middle of eye, chin prominent. Small teeth in narrow bands, no canines. Head and body scaly. Pelvics separate, do not reach vent, pectorals somewhat longer. Caudal rounded. Dorsal and anal low. Colour grey or yellowish with 12-13 broad dark bars across back, wider than interspace. A brown streak from eye to upper opercle. A black spot behind axil of pectoral. Caudal hyaline with black spots, a black spot at base and behind a short curved black cross line. Attains $2\frac{1}{2}$ cm. Known only from the Red Sea. Possibly identical with **africanus**, but has one less dorsal ray, an apparently wider interorbital and colouration as described is different.

18. Genus **Pogonoculius** Fowler, 1938

Fowler 1938, 134.

Genotype **P. zebra** Fowler, 1938. Elongate compressed body mostly covered with minute cycloid scales, head and nape naked. Mentum detached as median fleshy barbel. Mouth oblique, in each jaw a narrow band of fine teeth, outer series enlarged, and few widely set canines. Gill openings wide, but lateral. Caudal subtruncate. This genus is so like **Ptereleotris** Bleeker, as to be of doubtful validity. A single species, type from the Philippines, recently found in the W. Indian Ocean.

Pogonoculius zebra Fowler, 1938

(Pl I, E)

Fowler 1938, 134. Smith, 1956, 820, fig. 2.

D VI+I 27-28. A I 25-26. P 23. V I 4. 7+1+17 gillrakers. Interorbital about equals eye. Anterior nostril shortly tubular, posterior an ovoid pore. Series of papillae on head, across body and on tail. Barbel at chin thick and fleshy. Colour: live, gorgeous, as shown in Pl I. As preserved, pale yellow, darker markings much as shown in Pl I. Attains at least 95 mm. D'Arros and Aldabra Islands.

19. Genus **Laccoeleotris** Fowler, 1935

Fowler 1935, 361.

Genotype **L. lineopinnis** Fowler, 1935. Elongate compressed body covered with minute embedded separate cycloid scales, none on head. Long soft dorsal and anal. Gill openings wide, to under head. Pelvics longer than short rounded pectorals, bases separate. Caudal rounded. Teeth biserial, outer enlarged. Only the type known.

Laccoeleotris lineopinnis Fowler, 1935

(Pl I, F)

Fowler 1935, 403, fig. 35. Smith 1949, 944, Pl 73, fig. 2.

No specimen available. With characters of the genus. D VI+38. A I 36. P 23. V I 5. 5+15 gillrakers (in generic description stated as "short"; under species stated as "slender, lanceolate"). Interorbital $\frac{2}{3}$ eye. Colour as shown in Pl I. Known only from the holotype, 115 mm., found in the stomach of a "Flatfish" caught in 50 fathoms off Umzumbi, Natal, S. Africa (about 30° 35'S).

20. Genus **Ptereleotris** Gill, 1863

Gill 1863, 271.

Genotype **Eleotris microlepis** Bleeker, 1856. Elongate compressed body, with more than 150 minute cycloid scales. Head naked. Mouth oblique, small teeth in narrow bands, outer series larger, one or two caniniform. Gill openings wide but lateral only. Soft dorsal and anal long. V I 4. Caudal truncate or weakly emarginate. Tropical Indian, western and central Pacific. Few species, rare, 2 in W. Indian Ocean, differ widely in colour.

Ptereleotris microlepis (Bleeker), 1856
(Pl I, C)

Eleotris microlepis Bleeker, 1856, 102. Gunther 1861, 132. Playfair 1866, 75, Pl 9, fig. 5.

Ptereleotris microlepis Smith 1956, 817.

Ptereleotris playfairi Whitley 1933, 90.

D VI+I 27. A I 25-26. P 1, 20-21, 1 = 22-23. V I 4. 6+1+20-21 slender gillrakers. In percent of standard length: total length 122; depth 17; head 23; 4th dorsal spine 17; 6th dorsal ray 20; 3rd anal ray 14; pectoral 15; pelvic 19-22. Snout tip to dorsal origin 28; to anal origin 56. Eye 4 in head, equals interorbital.

Front nostril feebly tubular, hinder an ovoid pore, equally spaced between eye and lip. Dorsal fins separate, soft higher than 1st, front rays higher. Anal similar but lower. Pectoral short, reaches middle of 1st dorsal, pelvics longer, reach halfway and more to anal, bases adjacent, fins joined low at base. Caudal emarginate. Mouth oblique, maxilla reaches below front of eye. Rather larger recurved teeth in single series outside each jaw, narrow series of villiform teeth inside. Tongue long, narrow. Whole body and nape covered with minute embedded cycloid scales. Head naked.

Colour, live; as shown in Pl I. As preserved, milky white, a few vague lines on head, dusky bar across pectoral base below.

Described from several specimens, 90-110 mm., rare, found and observed in E. Africa north of 14°S, also at Aldabra, Alfonse and Cosmoledo.

Ptereleotris tricolor, Smith, 1956
(Pl I, A & B)

Smith 1956, 817, fig. 1.

D VI+I 25. A I 24-25. P 22-23. 6-7+1+18-21 slender gillrakers. In percent of standard length: total length 118; depth 17-18; head 22; 3rd dorsal spine 15; 3rd dorsal ray 14; 4th anal ray 13; pectoral 17; pelvic 17. Snout tip to dorsal origin 25; to anal origin 49. Eye 4 in head, equals interorbital. Whole body covered with minute scales, also with angular subvertical series of pores. Head naked, many series of pores. Front nostril low small tube, posterior a slit. Gill openings lateral only. Colour: live, as shown in Pl I, A & B, adult and juvenile. Preserved: whitish in front to level of soft vertical fins, rest dusky except mid rays of caudal. Attains 120 mm. Found in 1-5 fathoms about coral, rare, but occurs over most of W. Indian Ocean from 14°S northwards. One of the few free swimming members of this family, normally seen in deepish water close to coral.

Subfamily AUSTROLETHOPINAE
21. Genus **Austrolethops** Whitley, 1935

Whitley, Rec.Aust.Mus. 1935, XIX, 243.

Genotype **Austrolethops wardi** Whitley, 1935 from Queensland. Scaleless compressed body, with wrinkled flabby skin, eyes reduced, widely separated. Dorsal fins separate, 1st of 6 weak spines, no spine in 2nd or in anal. Pelvics I 4, reduced, separate. Pectorals short. Gill openings lateral, rakers reduced. A single species, known previously only from the holotype, recently found in the W. Indian Ocean.

Austrolethops wardi Whitley, 1935
(Plate III, L)

Whitley 1935, *ibid*, fig. 10. Smith 1958, in press.

D VI 14-15. A 13-14. P 1-2, 15, 0-1 = 16-17. V I 4. Caudal 7+15+9. 5 branchiostegals, typically 1+4, stained and cleared specimen showed 11+16 vertebrae. Gillrakers short, 4+1+11.

In percent of standard length: total length 120; head 26; depth 30; eye 3.2; interorbital 8; snout 7; postorbital 16; preorbital depth 5; dorsal spines, 1st 12; 2nd and 4th 15; 3rd 17; 6th 7; dorsal rays: 1st 7; 2-5th subequal 10. Anal rays: 1st 12; 2-4th subequal 12; pectoral 17; pelvic 19; depth peduncle 14. Snout tip to: 1st dorsal origin 33-35; 2nd dorsal origin 53-57; anal origin 60-64.

Mouth moderate, oblique, lower jaw projects slightly, maxilla reaches below front or middle of eye. Small slender sharp teeth in bands over front of each jaw, the inner series longer, recurved, those in front longest, on hinder part of each jaw only one series. Palate edentate.

Dorsal originates behind head, about twice as far from caudal base as snout tip, spines with free tips, increase to the 3rd, longest, membrane does not reach origin of 2nd dorsal. Soft fin lower than spinous, margin rounded, all rays except last divided. Anal inserted somewhat behind and similar to soft dorsal, last ray simple. Pectorals short, do not reach vent, 1-2 upper and 0-1 lower rays simple, the others bifurcate. Pelvics long and narrow, inserted slightly before pectorals, do not reach vent, of a feeble spine and 4 rays, 3rd longest, all divided. Caudal convex, shorter than head.

Colour brownish above, the top of head and most of body with fine dark specks, belly, chest and chin lighter, no spots. Spinous dorsal darkish, front of soft dorsal light, most of rest of fin dark, anal similar. Caudal light. Pectoral light with dark bar along upper half or all dusky. Pelvics black.

Described from 7 specimens, 16-60 mm. in length, taken in low tide pools among coral rubble at Inhaca, Pinda, Tekomazi (11°S), Shimoni and Aldabra.

Subfamily LIOTERINAE

22. Genus **Lioteres nov.**

Genotype **Lioteres caminatus n.sp.** Body elongate, moderately compressed, entirely naked. Head rather depressed. Nostrils tubular. Eyes large, covered by skin, possibly erectile, adjacent. Pelvic bases well separated, 5 rays, 4 apically digitate and curved outwards; or normal. 1st dorsal of 6 spines, joined to or close to 2nd. Gill openings restricted to pectoral base, 1st gill slit closed by membrane, no true outer gillrakers. In each jaw bands of fine teeth, an outer series enlarged, no true canines, palate edentate. Small fishes of coral areas, 3 species, Red Sea and E. Africa.

This genus is related to **Eleotrica** Ginsberg, 1933, the type from the Galapagos, far eastern Pacific. **Lioteres** differs from **Eleotrica** in having 6 dorsal spines, (and in the closure of the 1st gill slit?). In the peculiar digitate pelvics 2 species show even greater divergence from other genera, and merit at least sub-generic distinction from the 3rd species as well, as shown here:

- A. (Subgenus **Lioteres nov.**). Pelvics with outwardly directed digitate margin :
 - I. Hind nasal tube much the longer, 12-13 dorsal rays **caminatus n.sp.**
 - II. Nasal tubes subequal, 11 dorsal rays **vulgare**
- B. (Subgenus **Pseudolioteres nov.**). Pelvics normal, 4 outer rays divided, inner simple **simulans n.sp.**

Subgenus **Lioteres nov.**

Genotype **Lioteres caminatus n.sp.**

Lioteres (Lioteres) caminatus n.sp.



Fig. 11. **Lioteres caminatus n.sp.** Type, 38 mm.

D VI+I 12-13. A I 9-10. P 16-17. V I 5. Body moderately compressed, head moderately depressed, snout rather blunt. Eyes almost contiguous, covered by skin, upper margin above dorsal profile. Pores on head subtubular, one median in interorbital opposite front of pupil, another median opposite hind margin of pupil, 2 behind eye and others on canals. Nostrils widely separated, the anterior a moderate tube above upper lip before eye, the posterior a large erect tube at orbital margin, about $\frac{1}{2}$ eye diameter. Gill openings restricted to pectoral base, 1st slit closed by membrane, rakers reduced to 3, short, at angle. In percent of standard length: total length 120; depth 21; head 31; width of head 20; pectoral 23; pelvic 17; 1st dorsal spine 10; 3rd 14; 6th 8; longest dorsal ray 15; depth peduncle 11. Snout tip to: dorsal origin 36; 2nd dorsal origin 56. Head 3.2, depth 4.8 in body length. Pectoral 1.3, pelvic 1.8 in head. Width of head 1.5 in length. Eye 4.4.2 in head, equals snout.

Mouth moderate, cleft extends below or near middle of eye. Lips thick, notably upper, continuous, lower inner margin with a single row of fine villi. Premaxillary pedicels short, about half of rami. In whole upper jaw a single external series of about 14-16 well separated recurved caniniform teeth, largest in front, graduated shorter posteriorly, within these an irregular narrow band of minute close-set villiform teeth. In lower jaw, on each side in front, an anterior series of 3 moderate recurved caniniform teeth, anterior largest, behind these on each side a single wide-set series of about 7 similar teeth, the hinder more recurved; between these 2 series is an irregular band of much smaller sharp teeth. Tongue largely adnate, apex free, rounded.

First dorsal inserted well behind head, over basal third of pectoral, the fin rounded, 3rd and 4th spines longest, this fin connected by membrane to basal third of spine in 2nd dorsal. Soft rays increase in length to 5-6th, longest, longer than 3rd spine, thereafter shorter. Anal inserted below about 1-2nd dorsal soft ray, rays subequal, or increase slightly to penultimate, last ray shortest, fin ends before end of dorsal. Pectoral broad, rounded, reaches below 2nd dorsal origin, all rays divided, ends "feathery". Pelvics well separated, short, inner 4 rays divided, digitate, 5th simple. Caudal less than head, subtruncate or gently rounded. Body apparently quite naked. 22-24 series of sensory pores, mostly in vertical series of 2-3, along midline of side from below pectoral to caudal base.

Colour: live, brownish or brown yellow, with darker marks and bands as shown in Fig. 11, the dark bar across hind opercular margin always prominent. Young sharply banded, caudal barred, bands less defined with age.

Described from numerous specimens, 16-40 mm. in length, from E. Africa, Bazaruto northwards to Shimon. The type, 38 mm. length, from Shimon, in this Department.

***Lioteres (Lioteres) vulgare* (Klunzinger), 1871**

(Pl III, D)

Klunzinger, 1871, 484, (Red Sea). Ben-Tuvia and Steinitz, 1952, 10. (Red Sea; record). Marshall, 1952, 241 (Red Sea; record).



Fig. 12. *Lioteres vulgare* (Klunzinger), 26 mm.

D VI+I 11. A I 10. P 9+7=16. V I 5. No scales. In percent of standard length, total length 120; head 30; depth 23; eye 7.8; pectoral 28; pelvic 16. Head 3.3, depth 4.3 in length. Eye 3.6 in head, 1.4 times snout, 4 times interorbital.

Body little compressed, head rather broad and depressed, snout blunt, rounded from above. Eyes closely adjacent, covered with thick skin, obviously partly erectile. Nostrils in moderate tubules, subequal, posterior before eye. Subtubular pores on head, one, prominent, central, in front of interorbital, one behind interorbital, 2 on canal behind eye, one at centre, and one at end of groove from eye to pectoral axil. A series of papillae before eye down corner of mouth, a series each side of snout within nostrils to eye, several vertical and one horizontal on cheek, a series along each side of chin below. Gill openings restricted to pectoral base, 1st gill slit closed by membrane, no outer gill rakers apparent.

Dorsal inserted over front third of pectoral, 1st fin low, membrane from last spine reaches third way up 2nd fin. Anal inserted below 1st dorsal soft ray. Pectoral rounded, reaches above anal origin, no simple rays, the 9 upper notably short, somewhat thickened and apically bifurcated, subdigitate, the 7 lower apically almost "feathery". Pelvics widely separated, rays thickened, the apical branches fingerlike, curved out and up, inner ray more slender, as long as 4th. (See Pl III, D). Caudal short, rounded.

Mouth slightly oblique, maxilla reaches below middle of eye, upper lip deep. In each jaw a band of villiform teeth. A wide-set series of slender recurved teeth outside upper jaw almost to end. In lower jaw on each side in front 3-4 slender curved teeth. No inner recurved canines. Tongue subtruncate. No trace of any scales on head or body. Colour: alive, milky yellow with numerous brown cross markings as shown in Fig. 12. Fins light. As preserved, little change.

Described from a single specimen, 26 mm. in length, from a tide pool at Pinda, Mozambique. It seems in every way similar to a specimen of *vulgare* Klunzinger, from the Red Sea, kindly sent on loan by Dr. E. Trewavas, British Museum.

Subgenus ***Pseudolioteres* nov.**

Genotype ***Pseudolioteres simulans* n. sp.**

***Lioteres (Pseudolioteres) simulans* n. sp.**

Gobiosoma diadematum (in part) Klunzinger, 1871, 483. Ruppell 1835, 138?

Gobiosoma diadematum (non Ruppell), Gunther, 1861, 85.

Eleotris diademata (non Ruppell), Kossman & Rauber, 1877, 20.



Fig. 13. *Lioteres (P.) simulans* n. sp. Type, 45 mm.

D VI+I 12. A I 11. P 1, 15, 1=17. V I 4 1. In percent of standard length: total length 120; depth 14.5; head 25; pectoral 26; pelvic 21; peduncle depth 11; 1st dorsal spine 10.5; 3rd spine 12; longest dorsal ray 14.5. Head 4, depth 6.8 in body. Eye 4.2 in head, 1.2 times snout.

Body elongate, cylindrical in front, head depressed. Interorbital about $\frac{1}{2}$ eye, nostrils shortly tubular, anterior close before eye. Head with several rows of papillae below eye and preopercle. Interorbital spongy, no pores visible. A median groove from occiput to dorsal origin, a faint groove from eye to pectoral axil. Gill openings restricted to pectoral base, most of 1st gill slit restricted by membrane, 1+1+1 thick rudimentary rakers at angle. Dorsal fin inserted over middle of pectoral, 3rd and 4th spines longest, slightly less than body depth, membrane not to soft fin, most soft rays higher than 1st dorsal spine. Anal inserted slightly behind dorsal, somewhat lower. Pectoral reaches below 2nd dorsal origin, one upper and one lower ray simple, remainder branched. Pelvic reaches far short of anus, bases closely adjacent, 4 outer rays branched, inner simple, as long as 4th, caudal short, acutely rounded. No trace of scales on any part of head or body. Mouth oblique, lower jaw projects slightly, maxilla to below front of eye. About 8 caniniform teeth across front of lower jaw, a wide band of fine teeth inside. No enlarged caniniform teeth behind. In upper jaw a single wide-set external series of 6 slender caniniform teeth each side, extending near end of jaw, inside a band of fine teeth, some inner enlarged in front. Tongue subtruncate. Colour, as preserved, as shown in Fig. 13. Bar below 1st dorsal somewhat darker than others.

Described from the type, 45 mm. in length, kindly sent on loan by Dr. E. Trewavas from British Museum collection, labelled "1925. 12. 31. 51. *Heteroleotris diadematus* Ruppell, Gulf of Suez." Type in the British Museum.

23. Genus *Chriolepidops* nov.

Genotype *Chriolepidops nebulofasciatus* n. sp. Elongate moderately compressed body, head depressed, eyes adjacent. Nostrils shortly tubular. Band of fine teeth in each jaw, some outer enlarged. Head and body naked, except peduncle, where few series of cycloid scales. 1st dorsal with 6 spines; V I 5, bases separate. Gill openings restricted, 1st gill slit closed by membrane, no outer rakers. Related to *Gymneleotris* Bleeker, 1874: and to *Chriolepis* Gilbert, 1892, both from the far E. Pacific, here held to differ in having 6 spines in 1st dorsal (and in closure of 1st gill slit?). A single species from E. Africa.

Chriolepidops nebulofasciatus n. sp.



Fig. 14. *Chriolepidops nebulofasciatus* n. sp. Type, 37 mm.

D VI+I 11. A I 10. P 1, 14, 1=16. V I 4 1=I 5. In percent of standard length: total length 124; depth 17; head 22-24; width of head 19; pectoral 22-24; pelvic 19; 1st dorsal spine 11; 3rd 12; 5th 11; longest dorsal ray 13; depth peduncle 12. Snout tip to: dorsal origin 33; 2nd dorsal origin 52. Head 4.1-4.3, depth 5.5-6 in body length. Pectoral 1-1.1, pelvic 1.2-1.3 in head. Width of head 1.2 in length. Eye 4-4.3 in head, equals snout.

Head depressed, eyes virtually adjacent in front third of head. Distinct groove along above opercles. Nostrils shortly tubular, subequal. A pore between eyes and one median behind where orbits diverge. Rows of papillae on head — one along lower edge of preorbital over end of maxilla, down to join series along lower surface of lower jaw, 5 subvertical series below eye, slightly back and down, none on preopercle, a vertical series behind preopercle margin, a short oblique series back from middle of this, several series round lower surface of chin. Along middle of flank from pectoral apex about 20 short vertical series each of 4-5 pores to caudal base. Several similar series along side of belly from below pectoral base to anal origin. Gill openings barely surpass pectoral base, 1st gill slit closed by membrane, no outer gillrakers. Mouth small, lower jaw protrudes, maxilla reaches below mid to hind part pupil. Upper lip wide, teeth in narrow band in each jaw, outer series enlarged, increase posteriorly to recurved fangs, hindmost at middle of side of jaw largest. In upper jaw inside a single series of very small teeth, in lower jaw posteriorly a single series of minute teeth. Palate edentate. Tongue subtruncate.

Dorsal inserted well behind head, spines subequal, 6th shortest, membrane from 6th reaches origin of 2nd, 3-9th rays subequal. Dorsal and anal less than body depth, depressed, do not reach caudal base. Anal origin about below 2nd soft ray. Pectoral reaches short of 2nd dorsal, pelvic shorter, bases adjacent, fins free to base. Caudal rounded, about equals head.

Head and body quite naked below 8-9th dorsal ray, from where there are about 7-9 longitudinal series of 6-7 transverse small cycloid scales, lateral only, on peduncle they may not reach either profile.

Colour: alive, yellow brown, whole body with minute dark spots; brown specklings form 5-6 cross bars, wider than interspaces, not reaching ventral surface, the 1st below spinous dorsal, last across peduncle, a narrow dark bar at caudal base. Predorsal to eyes speckled dark. A dusky bar down over cheek from hind part of eye. Fins mainly light.

Described from numerous specimens, 18-48 mm. in length, taken in coral rubble over 3-15°S in E. Africa, also at Zanzibar and Pemba, the type, 37 mm. in length, from Pinda, Mozambique, in this Department.

24. Genus **Heteroleotris** Bleeker, 1874

Bleeker 1874, 295, 306.

(**Leioleotris** Fowler, 1934. **Riukiuia** Fowler, 1946).

Type **Gobius diadematus** Ruppell, 1828. Body little compressed, covered to shoulder with rather small mostly embedded cycloid scales. Head naked, depressed, with lines of papillae, no scales on nape. Fine teeth in bands, outer series enlarged, none on palate. Gill openings restricted to pectoral base, 1st slit closed by membrane, no outer rakers. Pelvics well separated, I 5, rays apically multifid. Indo-Pacific only, a few small species in our area.

Ruppell's original diagnosis of **diadematus** (1828) states clearly that scales are present, but in 1835 he stated the body was naked. Of this species Klunzinger, 1871, states that some specimens are scaled to nape, others naked. There has clearly been some confusion as a result of inadequate observation, which has persisted until now, and there has been no description of **diadematus** Ruppell, since those of 1828 and 1871 mentioned, which are inadequate for present needs. I cannot accept that a species of this type is likely to have the body variably naked or fully scaly, and in such fishes in East Africa a common pattern combination is an oblique bar from the eye down, and a marked dark bar below the spinous dorsal. It seems clear that 2 similarly marked small species have been confused, one naked, the other scaly, and there is no information about the nature and extent of the scaling on the one form, necessary for generic as well as specific definition.

From its virtual priority in the original descriptions, the form of **diadematus** Ruppell, 1828, with scales, I here designate as the genotype of **Heteroleotris** Bleeker. Despite all attempts, I have been unable to secure a specimen of this scaly form, so that some doubt must remain as to its true characters. However, by inference from the 2 E. African species described below, it is likely to be similar. If it is not, then **Leioleotris** Fowler, 1934 must be restored for the 2 African species. Dr. E. Trewavas has kindly sent me a specimen from the British Museum labelled **Heteroleotris diadematus**, from the Gulf of Suez, which is naked, does not properly fall here, and is described elsewhere as new.

Three species listed, distinguished mainly by scale count :

| | |
|----------------------------------|----------------------|
| A. About 30 scales, Tr. 10 | diadematus |
| B. About 36 scales, Tr. 14 | kenyae n. sp. |
| C. About 45 scales, Tr. 18 | zonatus |

Heteroleotris diadematus (Ruppell), 1828

Gobius diadematus Ruppell, 1828, 137.

Gobiosoma diadematum Klunzinger, 1871, 483, (part).

No specimen available, compiled from Klunzinger, 1871. Head naked, half as wide as long. Body covered with moderate cycloid scales. Lower jaw projects, mouth very oblique. D VI+I 11-12. A I 10. 30 scales, Tr. 10. Depth $7\frac{1}{2}$, head $4\frac{3}{4}$. Eye equals snout, 4 in head. 3rd dorsal spine $1\frac{1}{4}$ in head. Teeth in narrow bands in each jaw, the outer row, especially in upper, enlarged, some hinder lower caniniform. Palate edentate. Eyes adjacent. Pelvics quite separate, pointed, the outer rays longest, strongly bent outwards, not to anus. Pectorals pointed, $1\frac{1}{2}$ times pelvics, reach to anal. Dorsals connected, as high as body. Caudal rounded. Gill openings over pectoral base only. Grey or grey yellow, 7-9 more or less defined cross bars, not reaching belly, that below 1st dorsal sharpest. A bar from eye to lower edge of operculum. Dorsal dark spotted, darkish above, margin yellow. Anal hyaline, margin dark. Pectoral reddish, pelvics hyaline. Tail with yellow margins. 33 mm., not common. Ruppell states it is common in the reefs at Suez. This description may be a composite from confusion of species.

Heteroleotris kenyae n. sp.

D VI+I 12. A I 10. P 17. V I 5. About 36 series of scales, 21-22 from 2nd dorsal origin back; Tr. about 14 anal origin up. In percent of standard length: total length 120; depth 18-20; head 27-30; eye 6; pectoral 25-26; pelvic 18-20. Head 3.5-3.6, depth 5-5.5 in length. Eye 4.4-5 in head, equals snout, 4 times interorbital. Body robust, little compressed, head broad, depressed, snout from above broadly convex. Prominent lines of papillae on head as shown. Nostrils both shortly tubular. Gill opening restricted to pectoral base, 1st slit covered by membrane, no outer rakers. 1st dorsal origin over end of basal 3rd of pectoral, 2 fins closely adjacent, origin 2nd fin about midway between caudal base and hind part of eye. Pectoral rounded, usually reaches below 2nd dorsal origin, all rays divided. Pelvics well apart, not to anus. Mouth moderate, maxilla to below front of eye, dentition typical of genus.

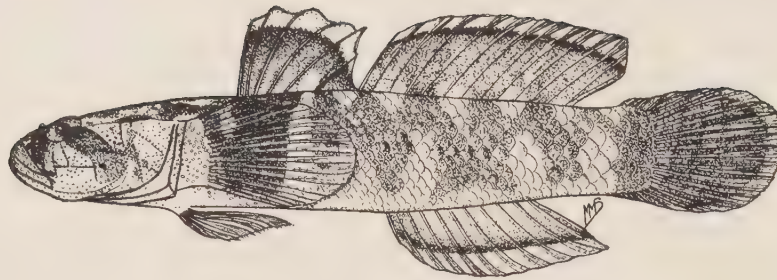


Fig. 15. *Hetereleotris kenyae* n. sp. Type, 41 mm.

Most of body covered with small partly embedded cycloid scales, larger towards caudal, none before line between 1st dorsal origin and pectoral axil. Scales clearly visible. Head, belly, chest and pectoral base naked.

Colour: alive; brown yellow, with darker brown bars and mottlings as shown, bar down from eye and that below 1st dorsal darkest. As preserved, little change.

Described from 4 specimens 25-41 mm. in length, all from Vuma, north Kenya (3°30'S), the type, 41 mm. in length, in this Department. A ripe female held about 200 eggs, 0.8-0.9 mm. in diameter. This species is clearly related to *Riukiuia poecila* Fowler, 1946 from Riu Kiu islands, Pacific, which has D V+I 11, A I 9, 29 scales, Tr. 12.

***Hetereleotris zonatus* (Fowler), 1934**

(Pl II, H, I)

***Leioeleotris zonatus* Fowler, 1934, 494, fig. 48.**

***Gobiosoma diadematum* (non Ruppell), Regan 1919, 200. Barnard, 1927, 829.**

***Hetereleotris diadematum* (non Ruppell), Smith, 1949, 338.**

D VI+I 11-13. A I 9-10. P 17. V I 5. About 45 series of scales; 25-27 from 2nd dorsal origin back. Tr. about 18 anal origin up.

In percent of standard length: total length 120; depth 18-21; head 26-28; eye 5.4-6; pectoral 24; pelvic 20-22; head 3.7, depth 5-5.2 in length. Eye 4.7-5 in head, 1.2 in snout, about 1.2 times interorbital.

Body robust, little compressed, head rather depressed. Head from above narrows before eyes, snout rounded. Prominent lines of papillae on head as shown. Both nostrils tubular. Gill opening restricted to pectoral base, 1st slit closed by membrane, no outer rakers. 1st dorsal inserted just behind pectoral base, origin 2nd fin midway between caudal base and eye. Pectoral rounded, does not reach 2nd dorsal origin. Pelvics well separated, do not reach anus. Mouth oblique, maxilla reaches below pupil. In upper jaw, a single outer widespread series of curved caniniform teeth, 2 on side longest, inside a moderate band of villiform teeth, a few median behind enlarged. In lower jaw in front on each side 3-4 recurved caniniform teeth, inside these a band of villiform teeth, behind these on side 1-2 recurved caniniform teeth. Palate edentate. Tongue truncate.

Most of body covered with small embedded cycloid scales, larger towards caudal, none before line between 1st dorsal origin and pectoral axil. Head, nape, pectoral base and front half of belly naked. The scales are quite invisible in the live fish and mostly so when preserved. Colour: in life as shown in Pl II, as preserved, yellowish, with a wide dark bar below 1st dorsal, another narrower from eye obliquely back, and a narrow line from eye to maxilla.

Described from numerous specimens, 20-55 mm. in length, taken in tide pools between Port Alfred and Zululand (27°S). A specimen sent to the British Museum was identified by Regan in 1919 as *diadematum* Ruppell, 1828 and has since been accepted as that by S. African workers. Fowler's 1934 description and figure contain errors, e.g. in text eye is given as $4\frac{4}{5}$ -5; whereas in figure it is 8 in head.

25. Genus ***Satulinus* nov.**

Genotype ***Satulinus zanzibarensis* n. sp.** Compressed body, head depressed, eyes adjacent. Body to shoulder with moderate ctenoid scales, belly, chest, pectoral base, nape and head quite naked. Gill opening restricted, 1st gill slit closed by membrane, no outer rakers. Pelvics I 5, well separated, normal. Known only from the holotype. Related to *Hetereleotris* Bleeker, but with normal ctenoid scales.

***Satulinus zanzibarensis* n. sp.**

D VI+I 9. A I 8. P 17. V I 5. 30 scales, Tr. 11. In percent of standard length: total length 122; head 31; depth 21; longest dorsal spine 14; longest ray 15; longest anal ray 17; pectoral 26; pelvic 21; peduncle depth 13. Eye 4 in head, 1.5 times snout. Pectoral 1.2, pelvic 1.5 in head.

Body moderately compressed, head rather depressed. Eyes high up, adjacent, no pores visible on head, anterior nostril on snout tubular, posterior close before eye, sub-tubular with flap. Gill openings restricted to pectoral base, 1st slit closed by membrane, no outer rakers. Dorsal inserted behind pectoral base, 1st fin low, 3rd and 4th spines longest, about $\frac{1}{2}$ head, soft fin higher than spinous, ends far from caudal. Anal inserted below 2nd dorsal ray, ends before end of dorsal. Pectoral with upper rays slender, silk-like, all

rays divided, reaches below 1st dorsal soft ray, 1-4 pelvic rays divided, inner simple, fin reaches half way to vent. Caudal rounded, $\frac{3}{4}$ head. Body covered with moderate ctenoid scales up to line between dorsal origin and pectoral axil; belly, chest, pectoral base, nape and head quite naked. Mouth small, maxilla reaches below pupil. Villiform teeth in narrow bands in each jaw, outer series slightly enlarged. Tongue deeply bi-lobed.

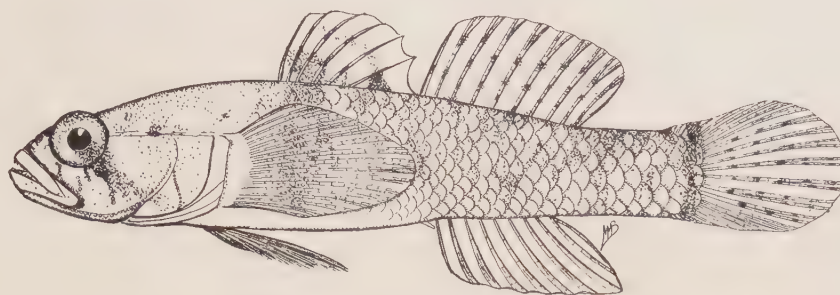


Fig. 16. *Satulinus zanzibarensis* n. sp. Type, 23 mm.

Colour: as preserved; greyish with minute dark speckles which form a vague bar from eye back to preopercle angle, a narrow dark bar below 1st dorsal and slightly narrower bar on base of caudal. 1st dorsal dusky, with 2 curved bars, lower ending in black blotch behind 6th spine. 2nd dorsal spotted, rays dark. Caudal with faint cross spotting. Pectoral and pelvic light.

Described from the holotype, 23 mm. in length, from coral pool, low tide, Zanzibar.

26. Genus *Dactyleleotris* nov.

Genotype *Dactyleleotris tentaculatus* n. sp. Elongate cylindrical body, entirely naked. Head robust, eyes large, close together, far forward above blunt snout, covered by skin, probably erectile, with large tentacle above. Nostrils tubular, the hinder large. Gill openings restricted to pectoral base, 1st gill slit closed by membrane, no outer rakers. Mouth large, in each jaw a band of fine villiform teeth, outer series enlarged, small canines in lower jaw. Related to *Liotes* nov., differing in shape of head, and from all other genera as well in the prominent appendage at eye. Known only from the genotype.

Dactyleleotris tentaculatus n. sp.



Fig. 17. *Dactyleleotris tentaculatus* n. sp. Type 26 mm.

D VI+I 12. A I 11. P 15. V I 5. In percent of standard length: total length 120; head 28; depth 18; largest dorsal spine (4th) 15; longest soft ray 17; longest anal ray 13; pectoral 20; pelvic 14; depth peduncle 12. Head 3.6, depth 5.4 in body. Eye 4.5 in head, twice snout. Pectoral 1.4, pelvic 2 in head.

Body moderately compressed, head robust, depressed at occiput. Body quite naked but with several series of papillae along middle of side, 6 below course of soft dorsal and one at base of caudal. Eyes far forward and high up, clearly erectile, contiguous, each with large fleshy tentacle $\frac{4}{5}$ eye diameter above, its apex trilobate. Front nostril a short tube midway between front of eye and front of mouth, posterior an elongate tube $\frac{1}{2}$ eye diameter. A prominent pore median behind orbits, several tubular pores behind eye. A transverse series of 4-5 papillae each side of occiput, several series of papillae on cheek, 2 at right angles. A series of papillae along each side of nape to before opercular margin. Gill openings restricted to pectoral base, 1st gill slit closed by membrane, no outer rakers. Dorsal inserted behind pectoral base. Pectoral reaches short of 2nd dorsal origin, 1 upper ray simple. Pelvics well separated, inner ray simple, reach far short of vent, half way to anal. Mouth large, maxilla reaches to or beyond hind margin of eye. In front of upper jaw a wide spaced series of fine caniniform teeth, one, lateral, largest, within a narrow band of fine teeth. In lower jaw on each side 4 or 5 teeth in front, almost exsert, behind these a band of fine teeth and one each side 1-2 recurved small canines. Tongue rounded, subangular.

Colour: brownish, densely speckled dark forming irregular blotches as shown in Fig. 17. Shimoni specimen lighter with series of dark blotches along dorsal and anal. Only 2 specimens, by poison in tide pools, one, 25 mm., from Shimoni, and the type, 26 mm., from Bazaruto, in this Department.

SPECIES OF UNCERTAIN IDENTITY

- (1) A drawing (Plate III, C) of a fish from Madagascar by Pike, labelled **Eleotris guttatissimus** by Bliss, was listed by Gudger 1929, 518 as **Eleotris guttatissimus** Bliss, not otherwise described. Illustration rather crude, but shows D VI+I 8: A I 8 or 9: about 45 scales, Tr. about 14: Depth about 4.5. Dark olive. Pectoral, belly, and hind edge pelvics pale. All fin rays and 2 oblique bands on 1st dorsal yellow. The type probably lost; may be **Eleotris macrolepis** Bleeker, 1875 known otherwise only from E. Indies. The illustration is reproduced by kind permission of the Director of the American Museum of Natural History.
- (2) **Eleotris gobioides** Valenciennes, 1837, a New Zealand species, has been recorded from Madagascar by Sauvage 1875, and Pellegrin 1914.
- (3) **Eleotrica** spp, 22 mm., recorded without description by Morrow, (Ann.& Mag.Nat.Hist. 1954, (12), VII, 815) from E. Africa.

FRESHWATER SPECIES

1. **Eleotris legendrei** Pellegrin, 1919, Madagascar.
2. **Eleotris tohizonae** Steindachner, 1880 (**pectoralis** Regan, 1903). Madagascar.
3. **Eleotris vittata** Dumeril, 1860. Madagascar. (A West African species, Madagascar specimens probably juveniles of **Ophiocara porocephala** Val., 1837).
4. **Typhleotris madagascariensis** Petit, 1933. Madagascar.
5. **Hypseleotris dayi** Smith, 1950. Zululand.

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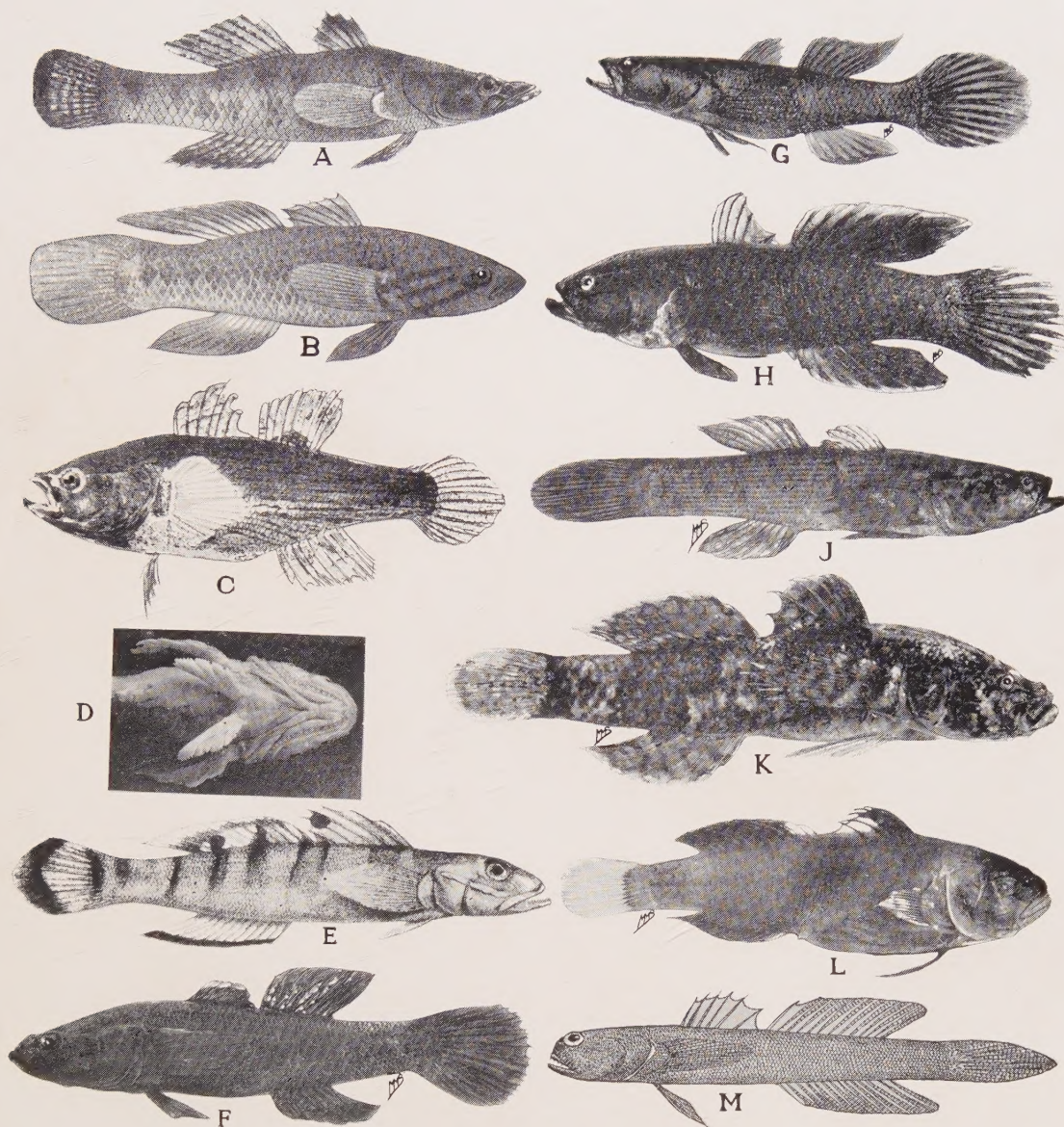


PLATE III

A. *Butis butis* (after Day). B. *Ophiocara aporos* (after Koumans). C. *Eleotris guttatissimus* (after Pike). D. *Lioteres vulgare*, pelvics. E. *Eleotris wardii* (after Playfair). F. *Eleotris melanosoma* 100 mm. G. & H. *Ophiocara porocephala*, G. 170, H. 320, mm. J. *Eleotris fusca*, 180 mm. K. *Mucogobius liolepis* 80 mm. L. *Austrolethops wardii* 60 mm. M. *Amblyeleotris periophthalmus* (after Koumans).

